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ON CHANNEL

CALLSIGNS and CLASS LICENSING

Surprisingly, amid the general celebrations that followed the end of CB licence fees, there has been some concern over the fact that stations will no longer be allocated "legal" callsigns. I say "surprisingly" because the few stations that were using official callsigns, at least on 27MHz, could almost be counted on one hand. True, most UHFers seem to use their official callsign if they use one at all and there are few "G'day, it's the Magic Mushroom" type operators on this service. There are, however, plenty of "music" stations and "let's jam the repeater" idiots on UHF and the chances of them using their official callsign are nil.

So what's the problem?

If you have been on air for some time you should already have a Government-issue callsign (providing of course that you're licensed) and you can continue to use it. If you're a newcomer, you can create your own sensible callsign, although you face the problem that someone else might create the same one.

A possible solution is to join ACBRO (see their column elsewhere in the magazine) and then see whether that body is prepared to start issuing callsigns. These callsigns could be logged by them, thus avoiding any duplicate callsigns, at least amongst ACBRO members. Overall though, given the choice of paying a licensing fee and being given an official SMA callsign, I think most CBers will happily settle for no licence fee/no official callsign.

DX - OR THE LACK OF IT

While it is generally agreed that international DX is currently largely lacking, it is certainly far from completely dead. There have been some excellent openings during the past couple of months (read the DX International column if you doubt this) but it is very much a case of being on air at the right time. Even then, probably 50% of this DX is out of band between channels 40 and 60 so, unless you're operating illegally, you're not going to hear it. That, however, still leaves the other 50% on legal channels, usually from ch 35 upwards and a week or so back there were U.S. stations booming in for around three hours. Mind you, the following day the channels were dead quiet again - as I said, you need to be in the right place at the right time - and be a bit lucky.

IN THIS ISSUE

First off our apologies for the follow-up antenna article to that published in the Nov/Dec issue not appearing in this one. Unfortunately the copy was received after deadline and will now appear in the March/April issue. Two articles which should interest you are the one on "communication intelligence" and the other on "scanners, encryption and telephones". Jack Haden has a look at noise problems on 27MHz and there is an excellent piece by Jason Reilly about getting the best from your scanner.

Enjoy the read - and have a safe Christmas.

WIN A UNIDEN 2500XLT SCANNER

For a chance to win one of these great new scanners, first read the review starting on page eight and then turn to page 50 for the entry form.
Good luck.

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COMPUTER CONTROL FOR THE FRG-9600

One of the good points of the Yaesu FRG-9600 is its ability to be controlled by your PC. Programs can be obtained that overcome to varying degrees the bugbears of the FRG-9600 — those of limited memory channels, inflexible scanning modes and poor scanning speeds.

One of the latest programs available as shareware to control the FRG-9600 by computer is titled FRGSC123, and can generally be found on good phone BBSs, such as Sydney's Shortwave Possums and Prophet, under the name of **FRGSC123.ZIP**.

While Yaesu's FIF/IF-232C will not work properly in conjunction with this program, the docs describe a very simple and *cheap* serial interface which is compatible with Yaesu's, costing a lot less while providing more features.

The program provides 1000 memories which will can store frequency, reception mode and a description field for each, a far cry from the standard 100 memories within the radio. The 1000 memories are set up into 10 banks of 100 channels for bank scanning. Individual channels can be locked out during memory scanning.

The operation of the program is roughly similar to the original procedure of the FRG-9600, so it is fairly easy for anyone familiar with programming and use of the radio. Two VFOs are provided with individual limits and steps.

There is a choice of steps from 100 Hz to 10 MHz for easy tuning and frequencies can be entered from the keyboard directly or retrieved from memory, all without touching the radio.

There are three scanning speeds provided, as is manual tuning and can be set to stop or pause on a signal, squelch release or a combination or both. The original scan feature on the FRG-9600 was an eight-second delay on interception of a signal. This was a major problem as you just started to get interested in what was being heard when the scanner recommenced its stepping!

One good feature of the program is that it can be a TSR (Terminate-Stay Resident) facility which allows scanning in the background while you are using the computer for something else.

The scan can be started with the program be put in the background. It will continue to run while other functions are happening on your computer. When a signal is detected, it will stop and issue a short beep to attract your attention.

When you exit the program, the state of the functions of the scanner, including the memory information, is saved unless you direct it otherwise. Exiting with ALT-X saves this info into a file called scanner.dat which is automatically loaded and updated when starting and exiting the program. The F1 key brings a crude form of help which comes up with a brief summary of the functions — basically just a memory jogger...

The F5 and F6 keys will retrieve and save the present frequency, mode and step into a buffer for retrieval. This buffer is automatically updated upon any change from DIAL to MEMORY or vice versa, so in effect F6 will function as a Memory to Dial key if pressed after an F5. F2 sorts the selected memory bank according to increasing frequency, but only changes the current bank.

F4 saves the current state of the scanner to file. This is used to update the file without needing to exit from the scanner.

F3 toggles the beep/silent mode.

There are times when beeps get to me and this key sorts that problem out.

F7 only works in Memory mode and allows the description field of the current channel to be edited.

This is the description field which is displayed along with the channel. This description field facility is a beauty, since I find that once I have entered a heap of frequencies into a scanner, I generally lose track of what service inhabits what frequency on what channel unless it is a busy frequency.

Sound familiar?

F8 toggles the VFO tracking action.

F9 toggles the current VFO between Dial and Memory mode.

F10 cycles through the three speeds for tuning and scanning.

The state of all three are indicated on the status bar.

F11 cycles through the scan-stop functions.

On the status bar, S is for Signal, Q for sQuelch and P for Pause.

Any scanning can stop or pause upon signal and/or squelch depending of which setting is selected. S-P- will pause on a signal while SQ— will stop on either a signal or squelch release.

Lastly there is a 'H' option which, when activated, will force the scanner to stay with the channel until the signal disappears.

F12 cycles through the six reception modes of the FRG-9600.

Shift-F1 will display the list of skipped bands. This is handy where you might otherwise forget what you have locked out. PageUp and PageDown will initiate scanning up and down respectively. The scan will be a memory scan or dial scan depending on what mode the VFO is in at the time.

Very simple to remember

This is just a fraction of the features of the program. ALL the functions of the FRG-9600 can be accessed via the keyboard with this program. The only time you need to touch the radio is to turn it on, or to adjust the volume or squelch.

The graphical interface of the program is pleasant to operate with and, provided your computer does not play havoc with your scanner, I would highly recommend this program if you have a FRG-9600 or similar. Distributed with this package is a version that will enable operation on an XT computer.

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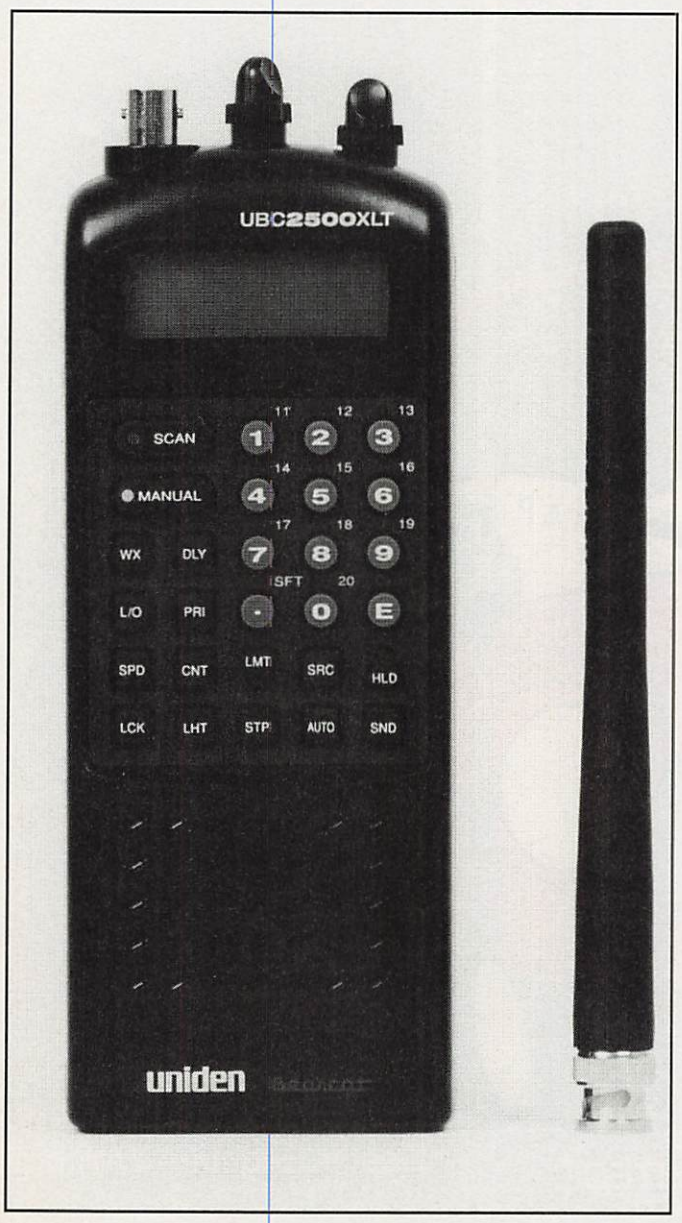
UNIDEN UBC-2500XLT WIDE BAND RECEIVER

Almost the missing link...

Reviewed by Ken Reynolds

In the past Uniden has remained contented with the manufacture of 'segmented' scanning receivers targeting the business band areas of VHF High and Low Bands and fragments of the UHF spectrum in pockets between 400MHz and 960MHz.



The UBC-2500XLT is a welcome departure from this limited, simplistic 'scanner' philosophy, and Uniden now caters for the majority of scanner enthusiasts who yearn for full frequency coverage from a wide-band receiver product. The UBC-2500XLT offers continuous frequency coverage between 25MHz and 1,300MHz with the exception of two breaks in sparsely-occupied territory between 340MHz and 400MHz, and between 550MHz and 660MHz.

While the new receiver has a couple of flaws that will lose it popularity with one particular section of the market, Uniden has managed to retain the built-in, 'easy-to-drive' operation which made its previous models so popular. To this already proven formula it has added extra frequency coverage and several other useful features.

Some other scanners, with their complexity of operation, have alienated themselves from a good portion of the market because they require the operator to enter complicated routines for memory allocation, signal detection mode and appropriate frequency steps for each band. This Uniden scanner receiver, on the other hand, is pre-programmed with the necessary information items, thus removing these responsibilities from the user and simplifying the UBC-2500XLT's operation.

To illustrate this feature, if a frequency is entered in the aircraft band between 108 and 137MHz, the 2500XLT 'knows' that transmissions in this band will be in AM (Amplitude Modulation) mode only and that frequency steps should default to 12.5kHz. The user, however, has the option of selecting any other available step size from a library of 5, 12.5, 25 or 50kHz as the need arises. To return to the factory default simply press the decimal (.) key twice.

Similarly, a frequency entered between 869 and 894MHz will default to 30kHz steps and the mode will be FM-N, which is the correct increment and demodulation mode for this part of the spectrum. Now that's really quite clever, if you think about it. The 30kHz step is not manually selectable from the step increment table for inappropriate band segments.

What happens is that the radio has the suggested parameters set as its defaults, but you can override those defaults if you wish. In the case of frequency step, the step sizes can be overridden by the STP key function. When the default step size is selected the 'step' frequency is displayed on screen, but in bands where the default is 30kHz, no step is not indicated at all. It then remains flashing for any other increment selected. Good idea? Again, press (.) twice to restore the factory setting.

The UBC-2500XLT has slower scan rates than the smaller and cheaper UBC-220XLT we reviewed last issue. The UBC-

220XLT offered search rates of 100 channels per second in normal mode, which increased to 300 channels per second when TURBO was selected. The UBC-2500 claims rates of a somewhat slower 20 channels per second for standard and 100 ch/sec for TURBO mode.

To check these specifications we set the SEARCH mode to 5kHz steps over a band segment of 10MHz and injected a 'marker' signal at the center of the chosen band — this is, equivalent to 2,000 channel steps. By measuring with a stopwatch the time it took for the receiver to cycle from the test signal frequency and return again, we were able to calculate the approximate stepping speed including the brief duration required for the receiver to reset back to the starting frequency. In our reckoning, the UBC-2500's step rate was pretty close to that claimed by Uniden. Our results, after a series of 'runs', were 19.6 channels per second and 94 channels per second.

This receiver also includes the WX or Weather broadcast utility channels that supply weather information for interested listeners around continental USA. We mention it here only to note that this high-band VHF service is not available in Australia and to save inexperienced listeners from wasting their time with this pursuit.

Counting channel stops

Of more interest (well, maybe) is the additional feature in this model of the COUNT (CNT) mode.

As you may have guessed, the UBC-2500XLT keeps an 'index' file to keep track of the number of times the receiver stops on each channel on the last SCAN sequence. To use this handy little facility, all you need do is set up your memory scan routine and use it in the normal way. When you decide to interrogate the index file for the number of 'latch-ups' for a particular channel of interest, or any of the channels in the last sequence, this is all you need to do: press (MANUAL) to halt the scan process. Next press (CNT) to set the count mode. The display will show COUNT just above a double digit readout indicating the number of times signals were detected on the channel number shown at the left of the display. Turn the channel switch to check the register contents for other channels, or select channels in the usual way by entering the channel number and pressing MANUAL. You can also step through the channels by pressing MANUAL once for each channel number increment.

Auto store function

Another new feature in this model is the AUTO store facility, which allows the user to set the UBC-2500XLT searching through a preselected chunk of spectrum all on its own. As signals are encountered by the receiver they are automatically entered into a user-defined bank of memories for later scrutiny by the operator. This feature could be very handy for detecting those elusive, occasional frequencies, and covert channels that only 'pop up' now and again, or become functional in the wee-small-hours or whatever. A word of caution, though. Carefully check the band of frequencies to be monitored for 'birdies' and bursts of RF interference or you are likely to end up with a memory bank full of rubbish.

This feature is also easy to operate. While in the SEARCH mode press AUTO to select the AUTO store mode — AUTO appears on the display — then enter the bank number(s) you wish to use as storage registers. Press AUTO again or MANUAL to cancel the feature.

Sending to memory

The use of SND or SEND seems a bit obscure at first but, after reading the manual, one can appreciate its usefulness. SND allows the user to instantly 'catch' an instantaneous frequency and 'send' it into a predetermined memory channel. Before beginning search you should select an empty memory (although it doesn't have to be empty) and position on the display. Enter the search mode and, when locked to a desired frequency, simply press SND to enter the SEND mode and press E to retain the frequency in the displayed channel number for later retrieval. Press SRC to resume search.

More of the same...

Having highlighted the new ideas, the UBC-2500XLT follows along much the same lines as Uniden receivers of the past. At power-on, the receiver starts out in the SCAN mode, so you need to press MANUAL to ready the receiver for its next operation.

The UBC-2500XLT has 400 memories organised into 20 groups (banks) of 20 consecutively-numbered channels, whose access can be easily manipulated. The banks can be switched in and out of the scan sequence at the touch of a button, while individual channels can be Locked Out (L/O) of each bank as the need dictates.

For example, you may wish to exclude all channels except two or three from one of the scan banks without actually erasing the contents of the memories. To do this, simply select the desired channel numbers and press the L/O key to remove them from the immediate scan sequence. Mind you, don't forget to cancel the 'lock-outs' later or you may appear to have lost a range of valuable frequencies at a later date.

An oldie but a goodie...

I should mention here one of Uniden's all-time best features which has appeared in Uniden's scanners for some years. The radio has a subliminal feature, or sub-routine, that goes into action invisibly every time you enter any valid frequency into a memory allocation.

The instant the E for ENTER key is activated, the CPU launches a lightning speed interrogation of all active memory channels in search of a duplicate entry. If it finds you have already entered the frequency some time in the past, the appropriate channel is immediately displayed in the viewing window. This allows you to then cancel the entry by pressing MANUAL, or to continue with the entry by pressing E a second time, at which point the entry will be accepted.

The only flaw with this function is that if you have entered the frequency into several channels, only the first entry will be located and displayed!

The other usual features include PRIority channel scan and SCAN delay functions which make for easy monitoring of a specified frequency, and simplified operation when trying to catch that elusive displayed frequency as it goes scanning out of view too quickly.

The UBC-2500XLT also has a lock (LCK) key to disable the keyboard and a light (LHT) key which turns on the display illumination for about 15 seconds for easier use at night. This latter function can be cancelled by pressing the same key for a second time.

Electro-mechanicals

The Bearcat 2500XLT case is matte black in color, and is cast in some sort of tough plastic in four sections. The first is the front panel, which contains the keypad and display window; there's a small top compartment which carries the rotary controls, antenna socket and audio sockets; the third section is the mid-rear case moulding and finally there's the lower one ....☞

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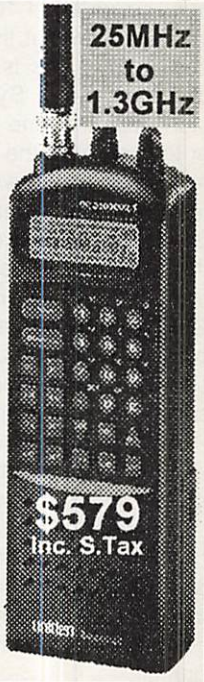

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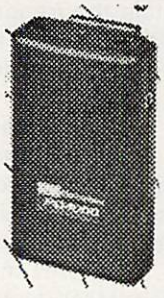

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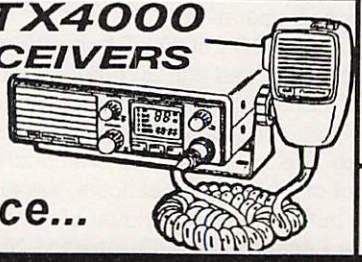

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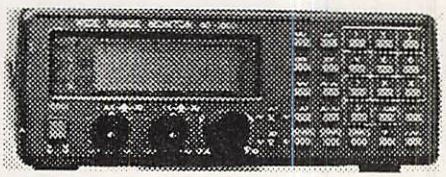

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UNIDEN UBC-2500XLT WIDE BAND RECEIVER

Continued from page 9...

third section, which contains the 6 volt 600mAh rechargeable battery pack. The battery pack snaps easily in or out of the main housing.

The case has a slightly curved styling (which is most obvious at the top) and measures 170mm high without projections (it's 185mm including the knobs but not the antenna) It's 67mm wide by 35mm thick, too, and while this makes it quite a manageable package, it's far from compact like the AOR AR-1500 or the Icom IC-R1 sub-compact. On the other hand, it feels very sturdy. Uniden's past portables have only provided for external audio with an earpiece, however in this model I am pleased to finally report that a second audio outlet is provided with sufficient level to adequately drive a loudspeaker. Hooray!

The unit is supplied standard with a heavy duty vinyl carry case and a not-so-heavy duty plastic belt clip. While not wanting to pre-judge the strength of the clip (and modern plastics *are* very rugged), we have had bad experiences in the past and therefore tend to favor ye ol' stainless steel. On the top panel adjacent to the BNC antenna jack are two sets of dual concentric, rotary controls mounted side-by-side. The left one accounts for the combination on/off/volume control, with the squelch on the lower ring. The right hand pair is a bit different, with the central knob defined as a channel/frequency change switch, while the lower outer ring is a type of mode switch. This one has three positions, namely (C) for CHANNEL selection, (F) for FREQUENCY stepping and (L) for LOCK position, the corresponding position dictating what will be the function of the rotary switch.

Performance

Receiver sensitivity of the 2500XLT is displayed graphically in **figure 1** showing its 'ups-and-downs' across the full frequency coverage.

The recovered audio is better than most past Uniden scanners, but we like the sound of the UBC-220XLT a little better. (See last issue CBA)

As we expected, strong out-of-band signals can still be quite troublesome, especially when the receiver is connected to a base station antenna around the suburbs, but the UBC-2500XLT generally exhibits good manners using the supplied antenna. The scanning speed is a tad slow when compared with the blistering UBC-220XLT, but it is still one of the fastest 'listens' around.

Summary

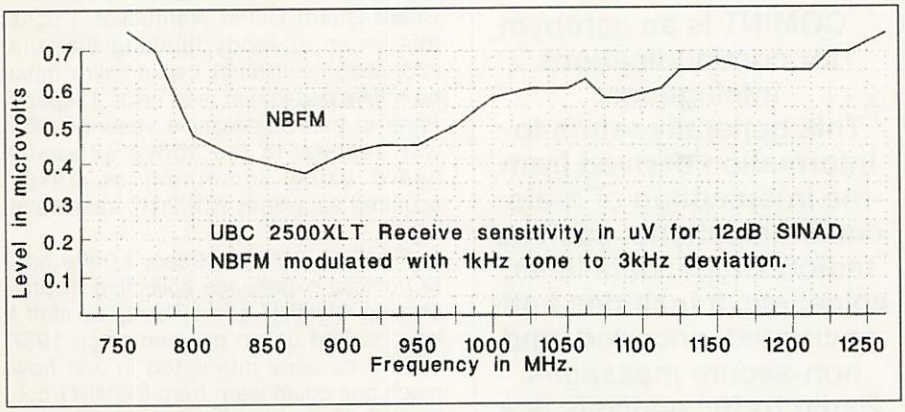
The UBC 2500XLT really is a great little performer, lacking very little in features. It caters well for all with its simplicity of operation, wide frequency range and host of user-friendly features.

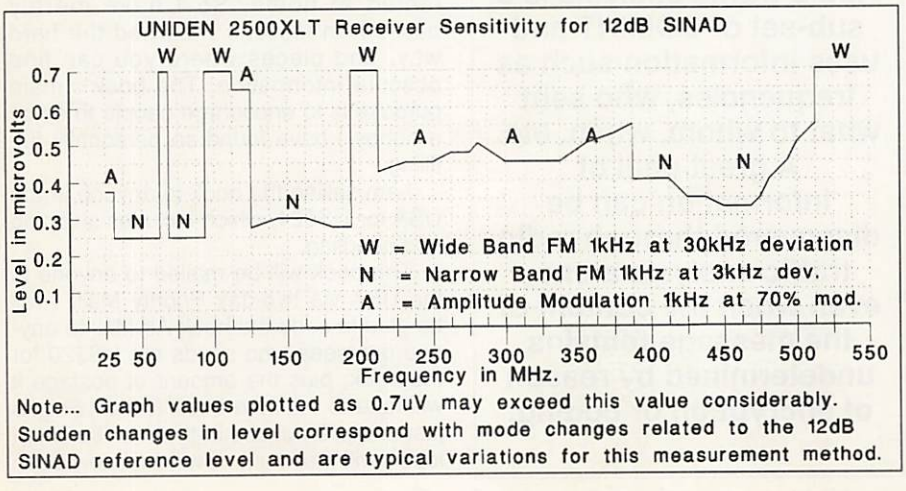
For Australia I would delete the WX button and substitute a mode function permitting the user to change between AM, FM-N and FM-W modes.

While the receiver sensitivity is quite good generally, a couple of other models do as good or perhaps a shade better overall.

At least all the relevant channel steps are available and, allowing for radical changes in the spectrum usage and structure, you should not have to buy another rig for quite some time.

Overall, then, the Uniden UBC-2500XLT is good value at around $600.




UNIDEN 2500XLT Receiver Sensitivity for 12dB SINAD
Level in microvolts
0.7
0.6
0.5
0.4
0.3
0.2
0.1
W = Wide Band FM 1kHz at 30kHz deviation
N = Narrow Band FM 1kHz at 3kHz dev.
A = Amplitude Modulation 1kHz at 70% mod.
25 50 100 150 200 250 300 350 400 450 500 550
Frequency in MHz.

Note... Graph values plotted as 0.7uV may exceed this value considerably. Sudden changes in level correspond with mode changes related to the 12dB SINAD reference level and are typical variations for this measurement method.

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If you're into scanning, SWL or utility hunting...

COMINT IS PROBABLY FOR YOU

American Tom Roach talks about his new book

Some news about my new book '***Hobbyist's Guide to COMINT Collection and Analysis***'. The book gives a brief account of COMINT as done by governments in the past and deals equally briefly with the horror and fear that governments have about this sensitive subject.

As the book points out, a great amount of very interesting COMINT can be collected by anyone with a good HF (3 to 30 MHz) shortwave receiver and the appropriate equipment.

The book details what type of equipment you need to collect various types of COMINT.

Most of the messages which are dealt with in the book were derived from the interception of Soviet/Russian radioteletype transmissions. It is pointed out that, with very little effort, many of the Russian messages' contents can be ascertained in general with only the smallest amount of knowledge of the Russian language.

The book will also soon be joined by one tentatively titled ***The Hobbyist's COMINT Russian Radioteletype Dictionary***. I am editing the book now, and hope it will be ready to sell by early to mid-October. It will be especially useful as it includes *only* those words seen in actual intercepts of Russian radioteletype messages and includes jargon you'll never find in any Russian dictionary. The words are give in both 'transliterated' Cyrillic, and the raw output of a the Universal M-7000 decoder, the device I use to 'decode' Russian RTTY. No Cyrillic is used.

One can read the current COMINT book purely for the pleasure of learning what some of the messages reveal, and to hear about the various adventures and misadventures I have had in pursuing the hobby.

A fairly lengthy section is given to how to analyse 'numbers' (*not* the ones you hear with somebody reading numbers in Spanish, German, or Russian) contained in messages the Russians send.

One such example featured in the book is of a Russian message sent by a research ship which was presented to me as being probably 'encoded or encrypted'. It turned out that it was not encoded or encrypted in any manner, and the book deals with how its meaning became 'obvious' after some analysis.

There is also a fairly lengthy section dealing with Russian *kriptogramma* messages, along with some recent news in the open press that explained exactly what one of the four (that I know of) 'kriptogramma' messages was used to keep secret!

There are numerous examples of the most common types of Russian radioteletype messages you would be likely to encounter. I also have sections on how to use your microcomputer to store and analyse these messages, and (hopefully) how to share your knowledge with other hobbyists. While I used the Cubans and Russians as the main source of messages, it is also pointed out that a great number of easily-intercepted messages can provide you with equally interesting opportunities, often in English.

COMINT is an acronym for communications intelligence. This generally refers to information derived from the interception of radio communications, such as radioteletype, data links, voice, etc. It includes both encrypted, encoded, and non-secure messages. Radio traffic analysis is a sub-set of COMINT and uses information such as frequencies, who sent what to whom, when, etc. A great deal of information can be discovered through radio traffic analysis alone, even when the content of the message remains undetermined by reason of encryption or coding.

Here is an example of the latter (and not quoted in the book). In just the last week, as I write, I managed to get Henry Kissinger's home phone number, and the phone number where one could reach George Bush that evening. I also monitored a very interesting military exercise involving soldiers, airmen, and probably Marines, F-18As, F-1s, and an aerial tanker (KC-135). One event was a night mission with pilots using IR goggles while landing five helicopters to pick up 160 troops, and a probable SEAL team. There were references to mortar firings, aircraft strip alerts, recon actions, and the usual squabblings and screwups involved in such manoeuvres. The exercise lasted over two days!

In addition,I picked up numerous Russian voice and radioteletype messages. I even picked up the live transmission of a CNN news crew from the Coast Guard Cutter Nantucket. I pass this on so anybody thinking that the information a listener can acquire must be totally pedestrian is in error. I repeat, *none* of this was from a scanner, and with respect to the above all easily heard using something as easily acquired as a Sony ICF-2010 shortwave 'toy'.

Finally I want to stress, I have had NO official experience collecting or processing COMINT ever! This is all stuff I have picked up on my own since 1987 when I became interested in just how much one could learn from COMINT collected at home. So I have merely passed on lessons I learned the hard way, and places where you can find obscure information. The book's main purpose is to encourage people to enjoy a hobby I have found so personally fulfilling.

I am selling the book to anyone in the USA for US$24, which includes shipping and handling.

The book will be mailed to anyone in the USA via two-day Priority Mail. I will be glad to send the book Air Mail to anyone overseas who sends me US$20 for the book, plus the amount of postage it will take to mail the book (which weighs just under 9 ounces in the manilla envelope I will mail it in). It will probably soon

become available through Universal Radio and Gilfer, both well known retail stores servicing shortwave listening hobbyists.

I will be glad to sell multiple copies to dealers, and let them price it as they will. My mailing address is:

Tom Roach,
1330 Copper Peak Lane,
San Jose, California 95120-4271,
USA.

Lastly, why must you buy this book? I need the money, and you need the pleasure of a new and vastly entertaining hobby. As a tickler, here's the Prologue to the book:

Prologue

This book was written so that anyone with normal intelligence, and the inclination to do so, can engage in the esoteric and 'hush hush' art of communications intelligence or COMINT. Communications intelligence is considered by most governments as the most sensitive and secret of all their intelligence activities. Most governments conclude that if details of such activity, or even the existence of COMINT operations, were to become public knowledge, cataclysmic damage will result to their 'national security'. It is always concluded that if the 'target' became aware of the existence, success, or extent of COMINT activities, they would change their security procedures and deny the listening party(ies) any further intelligence.

History is witness to the fact that even when governments are informed of failed security measures, they often fail to believe the facts, or are constrained by cost or circumstance from correcting their failures. There are also 'ethical' pressures which cause governments to wince at public admission of COMINT programs. The haughty American statesman Henry L Stimson is quoted as having said "Gentlemen do not read each other's mail".

It should hardly be a secret that almost any government larger than Monaco's is almost certainly monitoring the diplomatic and military transmissions of both friends and foes alike. Fears of 'Big Brother' in the United States are not so easily dismissed when citizens discover that the United States Army used COMINT during the 1968 Democratic Party Convention to spy on private citizens within our own borders.

For many people there exists a strong fascination with listening to, or reading, another person's or country's private communications. You will be surprised to discover the degree of success a hobbyist can expect to attain by a personal intercept and analysis operation of the sort described in this book. At a minimum, you will be able to intercept an astonishing number of foreign communications from the comfort of your home.

Certainly you will encounter private communications; some personal, some administrative, and some diplomatic. With the incredible computer power available today at remarkably low cost, it is not impossible that a very clever hobbyist might achieve some success in penetrating some country's cipher system.

Perhaps a gifted listener could even equal the success of Yardley, who personally broke not only America's top-level codes, but those of numerous other nations as well.

Yardley did this with nothing but his wits, intercepted communications, and hard work. This book will place in your hands the techniques required to routinely examine information that governments, corporations, and even your next door neighbor, would just as soon you didn't have.

Some of the messages I have personally intercepted may surprise you. In his remarkable study '***Soviet Naval Power in the Pacific***' Derek Da Cunha quotes an Australian MP "...supposed non-military [Soviet] fishing vessels have been logged sending messages in highly complex codes, far more complex than warranted by a report on fish tonnage caught.". I have personally intercepted many of these messages, which the Russians refer to as 'kriptogramma'.

A February 1994 news story revealed that the Soviets had used kriptogramma to cover up the fact that they were butchering twice the number of whales than they had agreed to!

One section of the book deals with these messages and gives clues as to how they might be generated by the Russians or decrypted by interested hobbyists. Then there are those very rare instances when somebody makes a mistake and sends a classified message in the clear. Not too long ago I monitored a four-page classified message sent by radioteletype by a branch of the United States military.

I provided the unfortunate radio station with a copy of the message in hopes that such slips could be avoided in future, and as a reminder that someone is listening when you least suspect it. In return, I received a letter saying that the matter was under investigation. The point is that you don't know what you will encounter unless you listen.

I have also intercepted a Russian 'research' vessel's reports classified as 'upper air' weather data. This vessel was located just a few miles offshore from Vandenberg Air Force Base during American test missile firings from Vandenberg Air Force Base to Kwajalein Island. Weather data of this sort was of significant intelligence value to Russian intelligence analysts wanting a better understanding of the success of American 'Star Wars' weapons testing. It is easy to see that even the most amateur of collection efforts can catch intelligence plums.

While not of such compelling security interests, but equally interesting, was an intercepted message to the captain of one Russian fishing trawler whose crew had accidentally spilled toxic waste on the catch.

The captain was directed to process and can the catch anyway! Other messages heard by hobbyists included a message from a Russian ship's captain discussing the activities of a 'mutinous' crew which was forming an illegal labor union because of 'unfair' promotion exam testing.

While the cold war is considered over, the Russians continue to operate a gigantic listening post located at Lourdes in Cuba.

continued on page 15....☞

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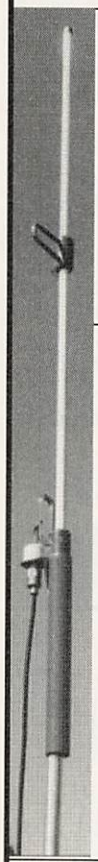

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If you're into scanning, SWL or utility hunting...

COMINT IS PROBABLY FOR YOU

(Continued from page 13...)

An agreement between the Russians and the Cubans, renewed in November of 1992, ensured that this listening post, targeted on the United States, would not end its mission.

The recent headlines surrounding the Ames case provide further proof that the Russians have not stopped spying on the United States. Between the covers of this book are the details on exactly how to snoop on sensitive, but easily accessible communications.

The communications you can easily monitor range from top level diplomatic communications between a government and its embassies, messages to and from spies, cellular phones, and 'baby monitors'.

The content of this information between a government and its embassies ranges from the serious (government diplomatic material and police channels) to the farcical (eg. the chit-chat, love-making habits, and gossip of your next door neighbor). I will leave the moral posturing regarding the ethics of this hobby for the reader's own resolution.

Nevertheless, there are certainly socially acceptable and useful ways of using certain types of information. I have a friend who started out listening to the Russians and ended up working hand in hand with the local police.

After the fall of the 'evil empire' he started using a scanner to monitor the local police's radio transmissions. He converted the information given in the police radio calls into maps and databases.

These are now distributed to both the police, and his neighbors. His reports reveal what is being stolen, where it's being stolen, and descriptions of suspects to watch for.

The beleaguered police welcome his efforts since budget cuts prevented them from buying their own computer to do the job! Besides, this is exactly the neighborhood involvement the police need to keep the vermin on the run.

While this book mostly deals with methods used for intercepting radio communications, it also details methods which will allow the reader to gather, and recall with ease, newspaper stories which are unlikely to ever be found in local, or for that matter, even the major national newspapers.

In some cases the news stories will provide a rational explanation for changes observed in the radio messages.

Equally important, trumpeted declarations of reform or change may be revealed as illusory by the absence of such changes which would or should have been reflected in radio messages.

On a personal level I have found the hobby to be a source of intellectual pleasure and delight.

I like to think of this hobby as the means by which I can extract a realistic portion of truth with which to balance the silly lies so often told by governments and foisted upon the public by an unsuspecting and all too often servile and lazy news media.

I personally believe a careful analysis of the news to be the duty of any citizen who wishes to maintain a democratic form of government.

The book is divided into three parts. The first part of the book is devoted to the specifics of the equipment you need to monitor radio messages, and details on how to put the equipment together to form an integrated and powerful collection and analysis system.

The second part of the book deals with how to analyse the material collected.

The last part of the book explains how to contact and exchange information with other hobbyists, thus sharing your knowledge and widening your expertise.

HOBBYIST'S GUIDE TO COMINT COLLECTION AND ANALYSIS

A Review:

An interesting review this month and a change of pace from your normal "utility" book. Tom Roach, a longtime utility digital and SSB mode/broadcast hobbyist, has authored and published this title.

"COMINT" is a military acronym for "Communications Intelligence", or the gleaning of information from communications. You have seen examples of this month after month in this very column! When you hear a certain aircraft say "switch to frequency Z32" and you tune around and find the same aircraft calling his station of "Z32", you have engaged in COMINT. You now have determined by an intercepted communication that frequency "XXX" is designated "Z32", for a simple example. Sometimes you may see a oddly formatted message sent from one particular station and wonder what it is and how you can figure it out.

That's some of what Tom Roach explains in this book.

The book is some 100 pages spiral bound; a format I admire in a radio hobby book as it makes it easy to sit down on a page you want to keep turned to, no page weights required!

Stressing HF comms and using Russian and Cuban RTTY/CW traffic as an example, Tom gives the reader his "lessons" which can be applied to any aspect of the monitoring hobby, including VHF/UHF/800Mhz scanner traffic. Myself, I have been involved in the "ute's" and scanners for a long time and have "gleaned" my share of information. But I was still fairly amazed at some of methods that could be employed to solve "radio mysteries".

Chapters cover needed equipment; where, when and how to listen; and the proper analysis of data. It is this last area, analysis, that never has received any real attention in any publication before. All the analysis lessons here uses REAL intercepted traffic.

I think those who are involved in military monitoring of any kind, and digital modes especially, will find this book of interest. The "Hobbyist's Guide to COMINT Collection and Analysis" by Tom Roach is available direct from the author at 1330 Copper Peak Lane, San Jose, CA, 95120-4271, with a suggested price of US$26.00 U.S. and Canada, US$26.00 for UK, Finland, Germany, and US$27.00 for Australian readers. The book should be available through Universal Radio and Grove's shortly. All direct orders include air mail shipping, but no credit cards accepted.

Rick Baker

Rick is a well known American operator who, among other things, compiles "utility listings" for the SPEEDX magazine.

The LISTENING POST

SCANNING THE SHOPS...

I've had several letters from readers asking for details of frequencies used by their local shopping centres, so I asked the gang on the computer bulletin board system (BBS) network around Australia for their offerings. Thanks to Michael Evans, Jason Reilly, Rob Seaman and Matthew Volkmer for their contributions to this hit list.

Nothing floated in from NSW or Queensland, so if you have some frequencies from these areas to add to this list, send 'em in and share 'em around!

Shopping centres are a curious combination of radio traffic.

Complexes belonging to larger chains such as Westfield and Stocklands tend to have at least one dedicated working channel used by centre staff, working out of the centre management office.

Security staff may use this channel or may have their own, depending on whether they are employed directly by the centre or are contracted through a security firm (in the latter case, check that company's known frequencies).

Some of the stores with multi-level car parks have parking coordinators at the main entrance and at various levels who advise which floors are full and in general keep things running smoothly (or as smooth as possible on a busy Saturday morning!).

These staff have been known to use spot simplex channels and even UHF CB.

Because two-way radio is no more than a tool for these people, they tend to use plain language.

The only time they'll stray from this is using simple alphanumeric callsigns (such as Mike 1 for the management office or Sierra 1 for security) or area designators (large centres are often divided into several 'sections' for electrical and maintenance purposes, which are sometimes known simply as Section 1, Section 2 and so on).

A little bit of listening and some first-hand observation will quickly fill in the blanks.

Note that we can't personally vouch for any of these frequencies: it's up to you to check them in your local area.

Victoria

101 Collins Street, Melbourne	463.400 (VH3GDI)
Altona Gate Shopping Centre, Altona	471.925 (VH3EIR)
Bay City Plaza Shopping Centre, Geelong	472.800 (VH3BAY)
Bayside Balmoral Shopping Centre, Frankston	471.925 (VH3GLX)
Corio Village Shopping Centre, Corio	463.300 (VH3GLD)
Eastland Shopping Centre, Ringwood	469.700 (VH3MEU)
Gladstone Park Shopping Centre, Tullamarine	450.475 (VH3GRQ)
Highpoint Shopping Centres, Maribyrnong	474.825 (VH3MHO)
Lend Lease Shopping Centre, Greensborough	40.680 (VH3LLS)
Malvern Central Shopping Centre, Malvern	471.875 (VH3FIN)
Northland Shopping Centre, Preston	473.750 (VH3OYK)
Pacific Shopping Centres, Forest Hills	450.425 (VH3GAW)
Parkmore Shopping Centre, Keysborough	40.680
Southland Shopping Centre, Cheltenham	469.650 (VH3MNP)
Sunshine Central Plaza Shopping Centre, Sunshine	450.475 (VH3GRS)
Westfield Shopping Centre, Airport West	469.650 (VH3MPT)
Westfield Shopping Centre, Doncaster	469.650 (VH3MOO)
Whitehorse Plaza Shopping Centre, Box Hill	450.475 (VH3MOS)
Wholesale Fruit Market, Footscray	469.750 (VH3MEG)

Perth

Armadale Shopping Centre	469.700
Belmont Shopping Centre	485.075
Big W	450.200, 450.325
Bull Creek Shopping Centre	494.150
Carousel Shopping Centre	462.150 (repeater)
Danella Shopping Centre	474.950
Floreat Forum	469.725
Forrestfield Forum	469.600
Garden City Shopping Centre	463.350 (repeater)
Innaloo Shopping Centre	450.300
Karrinyup Shopping Centre	461.350 (repeater)
La Plaza Shopping Centre	450.150
Maddington Metro	474.825
Midland Gate Shopping Centre	491.800 (repeater)
Mirrabooka Square	450.025
Morley Galleria	471.275
Myer	450.400,469.700, 469.725,472.875 (repeater)
Park Centre, Victoria Park	450.050
Phoenix Shopping Centre	472.700
Rockingham City	450.250
Warwick Shopping Centre	469.725
Whitfords Shopping Centre	474.825

Tasmania

Coles/Myer at Burnie, Devonport, Hobart and Launceston (used for security and data)	450.400
Eastlands Shopping Centre (Hobart)	494.850

Matthew Volkmer advises that although many frequency registers list 450.400MHz as being Kmart, he believes this frequency is in fact used for portable computer-type devices used by staff for tallying how much stock is left on the shelves and re-ordering as needed.

...and hearing the hospitals

We also decided to gather a batch of hospital frequencies at the same time for the same areas, so here goes.

Aberlin Family Trust, Anglesea	462.175 (VH3EUE)
Alcheringa Home Society, Swan Hill	463.375 (VH3FUU)
Alexandra District Hospital, Alexandra	40.380 (VH3ALH)
Alexandra District Hospital, Rennies Hill	79.360 (VH3GCR)
Alfred Hospital, Prahran	467.325 (VH3MFN)
Anglesea Community Health Centre, Anglesea	166.720 (VH3JMS)
Anne Caudle Centre, Bendigo	461.000 (VH3MGF)
Austin Hospital, Heidelberg	461.550 (VH3MBH)
Ballarat Base Hospital, Ballarat	159.310 (VH3JOC)
Ballarat Dispensary, Green Hill	71.270 (VH3CNN)
Benalla & District Hospital, Benalla	162.370 (VH3JVN)
Bright District Nursing Hospital, Bright	79.150 (VZ3JV)
Caulfield Hospital, Caulfield	463.025 (VH3MDU)
Colac District Hospital, Colac	148.662 (VH3BSF)
Cumberland View Retirement Village, Wheelers Hill	148.337
Dandenong & District Hospital, Frankston	462.850 (VH3OZO)
Dandenong District Hospital, Dandenong	469.650 (VH3MPB)
Daylesford District Hospital, Daylesford	467.025 (VH3NTW)
Diamond Valley Hospital, Greensborough	40.680

East Gippsland Centre, Bairnsdale	461.125,461.425 (VH3EOZ)
Eildon District Community Hospital, Eildon	79.360 (VH3DKW)
Epworth Hospital, Richmond	509.925 (VH3MLU)
Essendon & District Memorial Hospital, Essendon	494.100 (VH3NSU)
Frankston Baptist Hospital, Baxter	469.750 (VH3MML)
Freemasons Hospital, East Melbourne	474.900 (VH3MMP)
Geelong Hospital, Geelong	461.550 (VH3MNV)
Goroke Community Health Centre, Goroke	461.250 (VH3PCS)
Goulburn Valley Base Hospital, Shepparton	148.712,469.900 (VH3JSX), 148.812 (VH3GVM)
Goulburn Valley Base Hospital, Shepparton	(VH3JSX)
Goulburn Valley Base Hospital, Tatura	148.712 (VH3JSX)
Grace McKellar Nursing Home, Geelong	40.680 (VH3DAY)
Grace McKellar Nursing Home, North Geelong	474.850 (VH3MIZ)
Hamilton Base Hospital, Hamilton	148.362 (VH3OZZ)
Kerang & District Hospital, Kerang	148.662 (VH3JWM)
Korumburra District Hospital, Korumburra	165.550 (VH3JVL)
Kyneton District Hospital, Kyneton	157.750 (VH3ILT)
Lakes Entrance Community Health Centre, Kalimna	490.300 (VH3OOC)
Lakeside Hospital, Ballarat	164.290,164.680 (VH3EQT)
Lyndock Home & Hospital For The Aged, Warrnambool	148.337
Maldon Hospital, Maldon	158.620 (VH3IUS)
Manvantara Hospital Campus, Ringwood	148.337
Maryborough & District Hospital, Maryborough	160.270 (VH3DLQ)
Marysville & District Community Care, Mt Gordon	460.250 (VM3MCC)
Medical Control Centre, Mt Waverley	84.330 (VM3AL)
Mercy Private Hospital, East Melbourne	450.475 (VH3ONB)
Mildura Base Hospital, Mildura	148.812 (VH3FHG)
Mildura Base Hospital, Red Cliffs	474.225 (VH3FWL)
Minyip & District Hospital, Minyip	164.320 (VH3IPE)
Mont Albert Surrey Hills Hospital, Surrey Hills	491.175 (VH3NLE)
Mont Park Hospital, Bundoora	487.100 (VH3OZQ)
Mt Alexander Hospital, Castlemaine	159.670 (VH3GGM)
Myrtleford & District Memorial Hospital, Myrtleford	40.680
Natimuk Bush Nursing Hospital, Natimuk	162.610 (VH3ITZ)
Nhill Hospital, Nhill	509.475 (VZ3FM)
Numurkah & District War Memorial Hospital, Numurkah	40.680 (VH3JUW)
Ovens & Murray Hospital, Beechworth	164.680 (VH3JV)
Peter Mac Callum Hospital, Melbourne	509.550 (VH3MNE)
Portland & District Base Hospital, Portland	173.820 (VH3BME)
Prince Henrys Hospital, Melbourne	495.100 (VH3MNJ)
Queen Elizabeth Geriatric Hospital, Ballarat	164.680 (VH3JFI)
Queen Victoria Medical Centre, Melbourne	474.950 (VH3MQH)
Royal Childrens Hospital, Parkville	474.450 (VH3MJV)
Royal Eye & Ear Hospital, East Melbourne	450.350 (VH3MMH)
Royal Freemasons Hospital, Prahran	474.900 (VH3MLL)
Royal Melbourne Hospital, Parkville	463.675 (VH3MND)
Royal Park Hospital, Parkville	40.680
Royal Talbot General Hospital, Kew	450.075 (VH3FZL)
Royal Womens Hospital, Carlton	491.475 (VH3FDH)
Royal Womens Hospital, Carlton	509.575 (VH3MNL)
Shepparton Psychiatric Hospital, Shepparton	148.662 (VH3JTZ)
South Eastern Private Hospital, Noble Park	148.337
St Francis Xavier Cabrini Hospital, Malvern	450.300 (VH3MPC)
St John Of God Hospital, Ballarat	164.680 (VH3JJP)
St John Of God Hospital, Brighton	485.075 (VH3MPD)
St Vincents Hospital, Fitzroy	509.475 (VH3MOH)
Strathhaven Home for the Aged, Bendigo	164.680 (VH3FHI)
Swan Hill District Hospital, Swan Hill	162.370 (VH3DIB)
Tawonga District Hospital, Mt Beauty	162.370 (VH3JWY)
Terang & District City Hospital, Terang	164.530 (VH3JRI)
The Melbourne & Essendon Hospital, Moonee Ponds	148.337
Wangaratta District Base Hospital, Wangaratta	148.662 (VH3HOS), 164.680(VH3JTE), 494.825 (VH3FCP)
Wimmera Base Hospital, Horsham	148.662 (VH3JTB), 151.275 (VH3JTB)
Wodonga District Hospital, Wodonga	77.630 (VH3CTZ), 160.300 (VH3CTZ)
Yarrawonga District Hospital, Warrnambool	40.680 (VH3DHK)
Yarrawonga District Hospital, Yarrawonga	161.230 (VH3GUD)

South Australia

Queen Elizabeth	469.700
Royal Adelaide	162.460, 463.450
Glenside	485.150, 488.800
Hillcrest	485.900

Tasmania

Launceston General Hospital (Hays Hill, Flinders Island)	77.705
Launceston General Hospital (West Launceston)	78.220
St John's Park Hospital (New Town, Hobart)	78.220
Mersey General Hospital (Devonport)	79.270
North-Western General Hospital (Burnie — pager)	40.680
Royal Derwent Hospital (New Norfolk)	40.680, 77.330
Scottsdale Public Hospital (Scottsdale)	77.840
St Marys District Hospital (St Marys)	77.840
St Lukes Hospital (Launceston)	161.050
Hobart Pathology (Hobart)	161.050

The following ambulance services in Tasmania can talk direct to hospitals:

Glamorgan Ambulance Service (East Coast)
77.840
Tasmanian Ambulance Service
Southern region: primary 78.385, secondary 79.960
North-east region: primary 78.160, secondary 79.810
North-west region: primary 78.130, secondary 79.345
Tasmanian Ambulance Service (Campbell Town, Currie at King Island, Devonport, Huonville, Queenstown, Smithton, St Helens, Zeehan)
77.840
Tasmanian Ambulance Service hand-helds (not often used):
412.475, 412.750, 413.025, 413.225, 413.425
Tasmanian Ambulance Service (George Town)
484.525, 487.300

Again, if you have anything to add to this list, please drop us a line!

....☞

The LISTENING POST

NEWS FROM NEWCASTLE

The **Newcastle Scanner Group** (PO Box 728, Charlestown, NSW 2290) reports the following heard in and around their area:

On the NSW Central Coast, 489.225 at various beaches for surf life-saving and 132.750 for the Air Ambulance; 129.050 for AeroPelican; and 467.275 for the NSW Fisheries Dept.

Ambulance have been heard on 466.175 at Point Clare and 413.025 at Killcare, with 412.850 for direct contact between Central Coast control and Newcastle, and 463.650 for Tamworth to Newcastle.

Heading up the mid-north coast, 84.480 for VRA rescue; 172.650 for the RTA; 460.900 for the Great Lakes area bush fire brigade (this is a link to their VHF channel on 75.590); 474.775 for taxi cabs at Forster, and 487.375 for same at Taree; 76.760 for ambulance at Port Macquarie, and 82.380 is a wide-coverage VHF link for the police at Armidale, Guyra, Tamworth and Port Macquarie.

The NSG has several members on the Central Coast who are considering forming a 'sub-branch' for their local listening pleasure. If you live in this picturesque area and would like to mix it with some of your scanning neighbors, write to PO Box 212, The Entrance NSW 2261 for more information.

SKYRACE '95

Jason Reilly advises readers to add the following details to their diary in preparation for Tasmania's Skyrace 95 aircraft race, to be held Mid-February:

"The first half of this event is a navigational tour around Tasmania, and is expected to use 129.900 and any local area frequencies for airports and landing fields which are ports of call for the contestants," says Jason.

"The second half involves pylon racing (going flat-out around a set course marked by pylons). Listen on 129.900 (used by The Tasmanian Aero Club) 123.450, 126.350 and whatever private frequencies individual contestants may be licensed for.

"Race control, advisory, pylon judges and others may be heard on UHF CB channels 20 and 21, with parking coordinated by local youth groups on UHF CB channel 10."

Thanks, Jason!

AROUND AND ABOUT IN ALBURY

Nice town, Albury. Quite some years ago I did quite a few drives down to Melbourne and back, often down the Hume Highway. Like most people doing the Hume run, I'd stop overnight at Albury and head off the next morning. The trouble with this is that you don't really get time to appreciate this lovely region, including many of the smaller towns along the Murray (and the very nice wineries around there, too).

So next time you're heading south (or north) through Albury, stay a while. Of course, you'll want a few local channels to plug into your portable scanner (is *any* holiday complete without one?).

Local scanning buff David Lalor runs his Realistic PRO-2006 through a Bandspanner vertical and a discone, and says that in the past few months allocations have changed for many services around Albury/Wodonga and the surrounding border region.

The Victorian SEC, formerly on 72.560, has now moved to the state's MRN, so listen for it between 163.825 and 164.700. Wodonga's ambulance service (callsign VL3NS) was on 76.670, it's now 76.430 and 412.475. Albury Radio Taxis shifted from 164.380 to 163.4875, due to interference they were causing to the MRN system.

Finally, new UHF allocations for the Albury Police: 469.025 for areas west of Albury; 468.375 east of Albury; 468.450 for Albury City and 468.925 for the Albury police station; 468.200 to the north of Albury, with 469.325 for the areas north of Holbrook and 468.550 for Tumut.

Other good listening in the area (these are unchanged 'oldies but goodies'): CNR fire towers on 71.390 (with a link on 150.750); Murray River Electricity, 73.100; Albury Ambulance on 76.940, and fire brigade on 78.130; Auswide Security 81.780, Interceptor Security 158.590, MSS Security 168.490 and Armaguard 493.550; Albury Airport on 124.200 with the Air Ambulance on 132.750; Melbourne Flight Service on 118.600 and Melbourne Control 126.600; Wodonga Taxis 170.460; Albury police highway patrol on 168.070, Albury police chit-chat heard on 469.825 and Wodonga on 469.275; NRMA on 491.100 and VicRoads on 461.650.

Thanks for that great stuff, David!

CORRECTION...

Last issue we printed a list of frequencies and codes for the Albury/Wodonga area SES, which was attributed to Andrew Martin. While this information was correct, it didn't come from Andrew Martin, who is himself a local SES member.

TELECOM IN TASSIE

Jason also advises that Telecom has indefinitely delayed its plans to introduce a data dispatch system, so many of the channels once earmarked for data transmissions are now being used for voice contact. Here are the base transmit and mobile transmit (repeater out/in) pairs:

162.9875	158.3875
162.9125	158.3125
162.9750	158.3750
163.1000	158.5000
163.6625	159.0625
164.1625	159.5625
164.1875	159.5875
163.1125	158.5125
162.9000	158.3000

"The system is a split-simplex system, so you won't hear the mobiles on the base frequency unless they have activated the talk-through repeater feature," Jason explained.

"Be aware that users can dial into the phone system, and people can access the two-way radio system by phone, so no listening when phone calls are on the air! This won't be too hard to identify, since users have been instructed to say that they are using an unsecured channel to make a phone call at the beginning of the call."

Don't be fooled, however. Telephone-type sounds are part and parcel of the radio network. The system transmits a 'heartbeat' once a minute to enable voting. Selcalls zip back and forth constantly, and it's a very busy system during the daytime.

Also listen out for 519.975 simplex, used by line workers — 'linies', in plain language — around the state.

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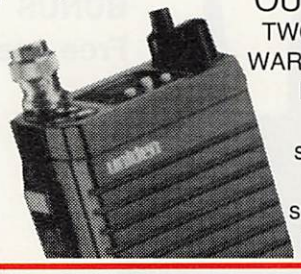

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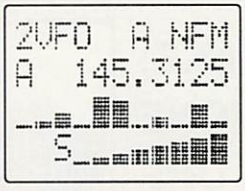

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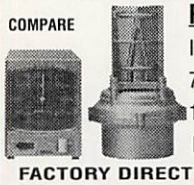

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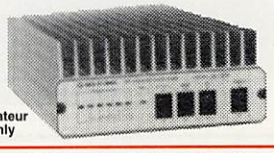

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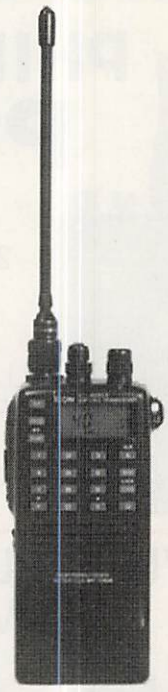

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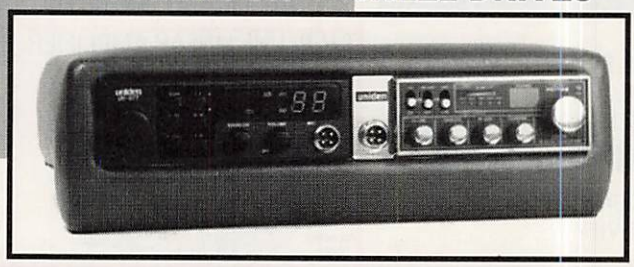

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Online 1994

By Patrick McDonald

Hi there, much-valued CB ACTION magazine reader! Why not push away that computer keyboard for a minute and turn down the volume on your favorite rig... cause now is the time to have a little old-fashioned magazine-type chat about using your radio together with your beloved PC.

Let's start by talking about one of the most useful things you can do with a computer to assist your radio hobby... keep track of the *thousands* of frequencies you want to have at hand instantly. Whether you're an amateur radio operator, a UHF/VHF scanner enthusiast, a tropical band DXer or a general SWL, you'll eventually want something more sophisticated than that dog-eared old school notebook and a blunt pencil.

Lots of database products are currently available, and many different listings of Australian HF/VHF/UHF frequencies. I know I spent a bit of ink on this topic in the last issue of CBA, but I'd now like to do a more complete, if somewhat brief, round-up of the latest database releases.

First, however, please remember the difference between shareware and commercial programs. This will save you some frustration and confusion later on. Shareware software is written for public release and free trials via downloading from computer bulletin boards around the world. The authors ask for payment only if you decide to use the program regularly, on a kind of honor system. Some useful computer BBS phone numbers for you to try out with your modem will be given later in this column.

Commercial software, on the other hand, is like what you buy at the shop. It's not available on computer bulletin boards and cannot legally be copied and/or distributed without breach of copyright. I'm sorry to have to repeat this info again, regular ONLINE readers, but I think it's important to be very clear about this distinction in the following software reviews!

Quite a new database offering, and another true-blue Aussie production, this time stemming from sun-drenched Melbourne, is Michael Evans' commercial **AUSBASE database**, version 2.0, which comes loaded with Australian frequencies across the UHF/VHF/HF bands. Yep, this is the very same Michael who runs the well-known SPECTRUM RADIO BBS.

The AUSBASE database set-up is pretty straightforward, with separate fields for transmit and receive frequencies, user name and trading name, location and call signs. You can update any and all fields and do searches, as required; you can also print out the data if you want, in frequency order, in user name order, and so forth, if you need a hard copy. If you've had any experience with databases at all, menu-based AUSBASE will be duck soup to run. If you have an IBM-compatible computer, just decompress the program and type AUSBASE2 to begin.

The total cost is $30 for executable database program together with a single set of state frequencies; each additional set of state frequencies costs $10. You can get the complete Australian all-state-and-territory database for just $65.

Ring the phone number listed below with your modem, or write to the following address to order AUSBASE:

Michael Evans
SPECTRUM RADIO
BBS/TALKBACK SYSTEMS
PO Box 8054
Northland Centre, VIC 3072

Also from the same Michael Evans come the regularly-produced FREQLINK Australian frequency lists, available in both ASCII and dBase formats. SPECTRUM RADIO BBS distributes these text files nationally, via a number of FIDONET BBSs, and as such are ready and waiting for downloading from many major radio BBSs. Shortwave Possums BBS and Satcom BBS carry FREQLINK files in Sydney.

In the last action-packed issue of CBA I mentioned the commercial **ESG Frequency Registers**, produced by Richard Barrett in Adelaide. I'm sorry to report that the executable database reader has been withdrawn, at least temporarily. So reports Richard to this writer in a recent phone call. However, all the ESG Australian frequency lists are still available, with a full range of UHF/VHF/HF frequencies, in both IBM-compatible and various Macintosh formats. On the PC side, these include Works for Windows, Microsoft Word and WordPerfect, ClarisWorks, and plain vanilla ASCII text files. Contact:

Richard Barrett,
ESG,
GPO Box 1200,
Adelaide, SA 5001

...or telephone voice (08) 410 2729.

Also mentioned in last issue's ONLINE was the excellent commercial **SI database package**, version 4, currently distributed by EVOLVING COMMUNICATIONS. Now, a two-part demonstration shareware version is available for downloading from many BBSs, under the compressed file names SI400SW1.ZIP and SI400SW2.ZIP. For the commercial version, contact...

EVOLVING COMMUNICATIONS
PO Box 205
Mt. Waverley, VIC 3149

Software author Andrew McColm gives voice support to registered users, and takes orders for SI on (03) 888 9446. You can also reach him at JK amateur radio BBS as noted a few paragraphs later on in this article.

Finally, to round out all the other frequency databases, I've just received the new version 3.04 **TRS Consultants** international shortwave frequency database from author Tom Sundstrom. Previously reviewed here in CBA, this great commercial package from the US, used by your writer for more than two years, has some additional features; the bonus is that it can actually load its frequencies into the memories of many popular receivers.

The purpose of the TRS program is to manipulate broadcast schedule data. Frequencies and schedules may be displayed or printed by country or by time. With version 3.04, there are additional capacities to add languages other than English, to identify USB and LSB modes and to enter azimuth bearings. User-entered data may optionally be retained and not automatically over-written by an update file. All records may, of course, be added, modified or deleted by the user, and schedules may be printed by country or by transmission start time.

Also available in the TRS database are international utility frequencies and the complete schedules of all known DX or communications programs on the shortwave radio bands.

The program will load a VFO or the memories of the Japan Radio

....☞

Company NRD-535, NRD-525 and JST-135; the Kenwood R-5000, TS-950S, TS-850S, TS-450S, TS-940S and TS-440S; the Lowe Manufacturing HF-150; the AOR AR3000; and the Watkins-Johnson HF-1000 and WJ-8711.

A special cable connecting your PC to your radio is required if you intended to load frequencies directly from the database to the receiver's memory banks. For the JRC installations a JRC-supplied cable is available. The Kenwood installations apparently require wiring a cable as per the IF-232C manual. TRS author Sundstrom says that for the Kenwood installations, in addition to the wiring shown, he found the DSR, DCD and DTR pins had to be shorted at the PC end of the cable. (On a DB-25, these pins are 6, 8 and 20; on a DB-9, pins 1, 4 and 6.) Check this if you have difficulty getting either receiver to respond to the LOAD command. The Watkins-Johnson receiver manuals are not entirely clear on the cable requirements. Note that a NULL modem cable is required; and on a DB-25 pins 2 and 3 are crossed. If you don't wish to wire your own cable, check Tandy, Dick Smith Electronics or other electronic/communications specialists for other cable possibilities.

The TRS database program supports Epson and Okidata dot matrix and Hewlett-Packard LaserJet and DeskJet printers. The embedded HP LaserJet printer codes enable both portrait and landscape printing using a letter tray. An additional option allows the user to specify printer codes for other printers not compatible with the three brands specified.

TRS frequency data files may be updated in any of three ways: change the files yourself from your own listening or from other information; download new data from US based 'Pics OnLine!' BBS on 0011 1 609 753 2540 (which will cost you a bomb), or via the US GEnie system, upon the payment of an annual TRS subscription fee; or purchase a data disk by mail containing new data files. This latter method is the one I personally use. I fax my credit card order to the US and get my disk back in five to seven days. Note that you can also reach author Sundstrom on the INTERNET at the address 2446376@mcimail.com, for further information. Otherwise, the relevant contact info is as follows:

Thomas R Sundstrom,
TRS Consultants,
PO Box 2275,
Vincentown,
New Jersey 08088-2275
USA

Voice orders go by phone 0011 1 609 859 2447, or FAX orders to 0015 1 609 859 3226.

Okay, so much for radio frequency databases. Now let's shift our focus to a completely different kind of computer software. '**Radio Manager for Windows**' version 2.01, released in September, is a control program for the Icom R-7000 receiver, which allows your computer to greatly extend your control over your beloved rig. The author, Texan Ben Saladino, says it should also work with other Icom radios, but he apparently hasn't fully tested it beyond the IC-R7000.

The new version 2.0 (available on various BBSs under the compressed file name of RM.ZIP) also works with the 'OptoScan456' from OptoElectronics. The OptoScan456 is a new interface for the Pro 2005/6 scanners from Tandy. The OptoScan456 decodes CTCSS and DCS squelch tones, as well as DTMF digits. It also reports signal strength. Radio Manager for Windows handles scanning, delays, five priority channels, lock-outs, presets, search ranges and more. You can also choose your own delay amounts and priority checking intervals.

The Radio Manager software stores its data in special Bank Files which can contain up to 999 banks each. Within each bank you can have 999 channels, so that's 998,001 available channels in all. Boy oh boy! (Your computer's available disk space may limit this facility.) You can choose your own channel and bank numbers, and each bank can have a description, and be enabled or locked out. Radio Manager comes together with the handy Frequency Manager program, so you can organise your frequency list. Radio Manager can then extract information from Frequency Manager files when needed.

Here are some more of the relevant RM features. It's designed to run under WINDOWS; this of course means that you can run other programs while Radio Manager scans. Each channel has a class and service description. There are user-defined delays and priority intervals. You can lock out individual channels or entire banks. A special lock-out review very usefully shows individual channels which are locked out. There is an unlimited number of search ranges and bank files, with five preset buttons for easy access to your favorite channels. All five channels can also be checked regularly as priority channels. You can choose to both scan and search up and down the range of frequencies and select delays for individual channels. The RM History Window shows the last 999 active frequencies and the Look Up feature displays information on known frequencies.

Another interesting and useful feature is the *History Window Hits*. RM now includes the number of times that active frequencies are listed in the History Window. In the History Window Save mode, RM can save most of the information from the History Window to a text file. This information can then be manipulated using other programs for analysis.

New signal detection methods have been added to the most recent RM version. Radio Manager now lets you choose from hardware detection methods, including Ring Indicator Pin 22, or Carrier Detect Pin 8, or software detection if you've got an Icom IC-R72, IC-R7100, or the super-duper top-of-the-line IC-R9000. There's also a new Temporary Lock Out feature. You can lock out a particular channel, but only for a limited, specified time. The channel will then automatically be unlocked after the time has elapsed. What will they think of next?!

RM requires a 386 (or faster) IBM-compatible machine with at least 4MB of RAM plus Windows 3.1 or later. SHARE.EXE must be also loaded for Radio Manager to function properly. An available com port and a computer-to-radio interface is needed — one which supports signal detection with the Ring Indicator (pin 22 of RS-232 connector), or Carrier Detect (pin 8 of RS-232), or software signal detection for the Icom IC-R72, IC-R7100 or IC-R9000 radios. Radio Manager for Windows does indeed work with the Icom CT-17 interface, but it will not stop scanning when a signal is present

unless you modify your CT-17 as described in the help file included with RM.ZIP, or have a radio listed above which supports software detection.

You can order registered versions directly with your credit card by voice (to the USA) on 0011 1 713 524 6394, or by FAX to 0015 1 713 524 6398. These numbers are for ordering only. The registration fee is $US30, and the handling charge outside of the US is $US7.

The RM author can be contacted, as follows, for technical information:

Ben Saladino,
660 West Oak Street,
Hurst,
Texas 76053-5526
USA

His voice telephone is 0011 1 817 282 0331.

On Internet...

How could we possibly let an issue of CB ACTION pass by without at least a mention of the burgeoning INTERNET? Every month, more and more facilities are available there for us radio folks. Stations such as the **Voice of America** are even putting their various news programs online for FTPing, so that you can actually *hear* the programs via your PC's sound card! Kind of defeats the purpose of radio broadcasts, I know, but it's a glimpse into the future...

More directly useful is the INTERNET's World Wide Web, which can be accessed by the famous MOSAIC program (if such is available with your particular service provider) or the more simple, text-based LYNX program, presently used by yours truly. Try the following for radio information:

http://itre.uncecs.edu/radio/#text
http://itre.uncecs.edu/radio/#Shortwave
http://itre.uncecs.edu/radio/#Radio
http://itre.uncecs.edu/radio/#Satellite
http://itre.uncecs.edu/radio/#pec
http://itre.uncecs.edu/radio/#HCJB
http://itre.uncecs.edu/radio/#CBC
http://itre.uncecs.edu/radio/#BBC
http://itre.uncecs.edu/radio/#VOA
http://itre.uncecs.edu/radio/#NHK
http://www.ntt.jp/japan/NHK

Via my own APANA service provider, I simply type LYNX at the UNIX prompt and then enter one of the above lines. Give it a try! Ask your own particular service provider if you're not familiar with the MOSAIC or LYNX programs.

Here's some late-breaking news about program updates. It's a shame, but space doesn't allow full reviews of all the great radio-related shareware being written these days...

SOP9435.ZIP is the compressed name of the latest version of the well-known **STS ORBIT PLUS** satellite tracker, of interest to you satellite communication buffs. We've reviewed this package more than once over the past two years, and the upgrades just keep on coming. It's a shareware program, so check your nearest radio-related BBS.

GEOCLK60.ZIP is the newest version of the famous **GEOCLOCK** world map and greyline DXing program, also reviewed here in CBA more than once. This is a major upgrade and worth getting if you're already using version 5. I hope to properly review this great software again in an upcoming issue.

Finally, **ID_SW491.ZIP** and **ID_NA491.ZIP** have arrived on the scene in recent weeks, being newer versions of the intriguing shortwave and medium wave radio simulators reviewed in the last ONLINE. I believe further upgrades will soon be on the way from Hong Kong, so watch this space for more announcements.

Before we come to a screeching halt in this mag, let's note some phone numbers of the computer bulletin boards where you can access some of the shareware mentioned above. But please remember that each sysop will have his own rules of usage. You'll be told these when you first log on.

SPECTRUM RADIO BBS now has two telephone lines and brand new Remote Access BBS software as well. Try Michael Evans' system 24 hours daily on either (03) 459 5837 or (03) 455 1309.

THE RADIO SHACK BBS, run by Simon Kay and Dave Onley, is a good place for radio amateurs to seek out packet radio information, as it operates as a packet radio gateway. Try this system 24 hours daily on (03) 532 5737.

JK AMATEUR RADIO CLUB BBS is on (03) 888 7741 in Melbourne under the care of sysop Andrew McColm.

Chris Keladis' **THE TWILIGHT ZONE** in Sydney carries a lot of radio software on (02) 750 6117.

Don't forget Paul Britton's **SATCOM AUSTRALIA BBS** on (02) 905 0849, for all your satellite DXing software requirements and the latest satellite elements for tracking programs.

New **BLUE SATELLITE BBS** sysop Mat Powell gives his phone number in country NSW as (043) 40 4851.

And venerable Sydney-based **SHORTWAVE POSSUMS BBS** is naturally still alive and well on (02) 651 3055, and accepting all modem speeds up to 14,400 bps. Interested in all this software but got no modem?

Well, let it be a lesson to you! Just kidding... all is *not* lost, even in that case. I will personally post you a selection of the shareware (not commercial) packages reviewed in this column if you send $35 plus six formatted floppy disks to the now legendary address:

SHORTWAVE POSSUMS BBS
attn Patrick McDonald,
PO Box 357,
Round Corner, NSW 2158.

BINT SERVICES FOR ALL YOUR QSL CARD REQUIREMENTS
Fully customised to suit your own needs or pre-printed.

100 fully customised cards cost as little as $19.50.
Send a 95 cent stamp to cover return postage for samples and prices to...
BINT SERVICES
PO Box 622
Mount Eliza
3930

DX Logbook

Greetings one and all to another bag full of SW goodies. This time around we have an update to what's going on at VOA, information on how SW listeners can get on the SW information highway, as well as news from the Benelux DX Club with some good DX catches. All times are in UTC, the same as GMT or 'z', and all frequencies are in kiloHertz unless stated otherwise. Now on with the news...

VOA confirms the closure of Bethany

Continuing on from my last column it's been announced that VOA *does* intend to close Bethany. John Vodenik, resident VOA worker at Bethany, has now confirmed that Bethany will close its doors on January 4, 1995.

As a thank you to the many loyal VOA listeners, John is organising a **last day QSL card** which he is paying for out of his own pocket. The date for the last transmission hasn't been announced yet, but I'd expect it to be around the date the doors close.

To get this rare QSL card you'll need to send two IRCs with your reception report to John Vodenik, 104 South Forest Avenue, Mason, Ohio 45050, USA. John will post the complete sked for the last day of transmission on Internet as it becomes known.

He is planning to print some 1000 to 1500 cards. This will be your last chance to catch Bethany as well as receiving a rare QSL.

VOA makes changes to Communications World

With the new transmission period under way, many stations have made changes to not only their frequencies but programming as well. VOA produces a very interesting program for those who like to follow technical changes in the world of communications. **Communications World** is aired on Saturdays over regular VOA broadcasts and will now go out at the following times: 1030, 1230, 1730 and 2130.

There is also transmission at 0030 on Sundays, directed towards the Caribbean. Thanks to *Kim Elliott* from the VOA for that update.

A peek inside WRTH 1995

Andy Sennitt has sent me a short E–Mail message outlining some of the highlights you'll find in the 1995 edition of the handbook. The handbook has been working towards a 100 per cent computerised production for some years now, which will provide many benefits to all from the editorial team right through to the user. You can expect to see more time being spent on improving the data contained in the book rather than time spent compiling the data.

According to the production team, preparation for each annual handbook begins early in the new year, working towards 26-hour days (!) as the final pages are put together at the end of the year! The 1995 edition will contain for the first time an official list of medium wave stations in Vietnam, while in the 'Listen To The World' section George Wood has an article on computers and DXing, as well as details on the St Petersburg Broadcasting Center in Russia.

For the first time, my contribution to the handbook has been done fully electronically, bypassing the need for a typist to be involved in The Netherlands.

Update From Cuba

Radio Havana introduced a new sked on November 1, and in its English broadcast between 2100 and 2200z it will be using 11,720kHz. Its SSB transmission to North America is on between 0000 and 0500z on 9820kHz.

That update courtesy of *Erik Koie* from Copenhagen.

A touch of Asian...

Scott Gennari from Hawaii has posted this English sked on Internet for the **Voice Of Free China**, which remains in force 'til March 26 next.

To **Japan** and **Korea** on 15,345 at 0200 and 0300; on 11,745 at 0300; at 1200 on 7130.

To **South East Asia** on 11,825 at 0200 at 0300.

To **Central America** at 0200 on 11,740.

To **North America** at 0200 on 9680 and 5950; at 0300 on 9680 and 5950; at 0700 on 5950.

To **Australia** and **NZ** at 0200 on 7130; at 1200 on 9610.

To **Europe** on 9850 and 5810.

Shortwave over Internet

Carrying on from the article in the last edition of CBA on Internet, I thought I'd pass on a useful tip to those who have access to SMTP mail over Internet but can't actually communicate with the Internet directly. Many organisations use commercial mail programs, like **MS Mail** to exchange E–Mail around the world.

On the Internet a news group called **Rec.Radio.Shortwave** carries some 50 messages a day on SW, MW and utility topics. But if you don't have access to a shell account on a machine which connects with Internet, you *can* receive news on SW as E–Mail right to your desk!

Many news groups on Internet have what they call *List Servers*. These are computers which maintain mailing lists on people who wish to receive an E–Mail message (SMTP) as they don't have access to newsgroups on the net. So every time someone writes a message to a newsgroup, all the people on the mailing list get an E–Mail message sent to them with the contents of the newsgroup message.

In our case Rec.Radio.Shortwave, there is a mailing list maintained at **listserv@cuvmb.columbia.edu**. To get your name added to the list make up a normal E–Mail message (SMTP format) with the above address, and in the contents field type **SUBSCRIBE SWL–L**. The message will be routed to the list server and your name and E–Mail address will be automatically added to the list of people who see Rec.Radio.Shortwave.

The List server will acknowledge that it has received your message and added your name, and will also send details of other commands you may need as well as how to unsubscribe from the list. You can also participate in the newsgroup by sending a message to swl-l@cuvmb.columbia.edu. So that's all there is to it.

HCJB makes changes to Pacific service

As the solar cycle reaches its minimum, stations are being forced to move to lower frequencies or lose their audience. HCJB fell into this trap during the last transmission period when it cancelled its regular airing of **DX Partyline** directed to us at 0740 on Saturdays. The 1010 airing remained, but HCJB was using a frequency which not only faded out too early, but suffered co-channel interference from the BBC at Singapore.

I contacted Richard McVicar at HCJB back in October and pointed the problem out to him. Richard wrote back saying that the station would love to use a lower frequency into Australia but didn't have an antenna available at that time for us. Well, it does now...

Effective from November 1, HCJB started using 6135 from 0700 to 1130 replacing 11,925. 9745 will now close at 1030.

Polish Radio's English output

Radio Polskie has released its new sked effective to March 26 with English at the following times: **1300 to 1355** on 11815, 9525, 7270, 7145 and 6135. **1800 to 1855** on 7285, 7270, 5995. **2030 to 2125** on 7285, 6135 and 5995.

Austrian update

Austria introduced its new sked effective September 25 to March 25, 1995. English is as follows:

To **Australasia** 0830 to 0900 on 15,450 and 17,870, with a further transmission 1030 to 1100 on the same frequencies Monday to Saturday only.

To the **Far East** 1230 to 1300 on 15,450 and 1330 to 1400 on 15,450.

To **South** and **South East Asia** 1530 to 1600 and 1630 to 1700 on 11,780.

To **Africa** between 1930 and 2000 on 13,730.

DX news from the Benelux DX Club

• **Radio Intercontinental** is broadcasting in English on 15,400 from 0700 to 0705. Also from Armenia, **Radio Yerevan** is on 9480 in English at 2300 followed by French at 2330.

• **Radiodiffusion Nationalse Congolaise**, also known as **Radio Congo**, is on air as follows: 0400 to 0659 and 1700 to 2130 on 4765 and 5985; 0700 to 1059 and 1400 to 1659 on 7105 and 9610; 1100 to 1359 on 9610 and 15,190. News in French is transmitted at 0500 to 0530, 0700 to 0710, 0800 to 0803, 0900 to 0902, 1000 to 1003, 1200 to 1215, 1330 to 1357, 1500 to 1505, 1800 to 1830 and 2100 to 2115.

• **Radio Africa** from Bata in Equatorial Guinea has been heard on 15,190 at 0730 and 2200 to 2300 in English with Evangelical Christian programs.

• **Voice of Ethiopia** from Addis Ababa in English to Africa is on between 1600 and 1700 with French from 1700 to 1800 on 7165 and 9560.

AWR Asia in English

Bruce MacGibbon has passed on a new AWR sked he received from Dr Adrian Peterson: English is aired from 1500 to 1600 on 9370, at 1600 on 9370 and finally from 2300 to 0000 on 11,980.

Some Scandinavian news...

Radio Sweden's English broadcasts to Asia and Australia are broadcast at 1230 on 13,775, 15,120 and 15,240, at 2330 on 11,910 and at 0130 on 9895 and 11,695.

Thanks to *Frederick Gordts* for the info.

RADIO ST. HELENA DAY - HOW IT ALL STARTED

There have been a lot of questions about the background of the transmissions from Radio St. Helena. The following is from Lennart Deimert who posted the following report as received from John Ekwall, one of the St. Helena Day organisers.

Back in 1990, I (John Ekwall) was contacted by the organizers of NorDX. I was asked to help them put Radio St. Helena in the SW-bands within the contest this year. After many telephone-calls and faxes to various authorities, a permit was granted for a one-off-transmission on the assigned frequency of 11.092.5 kHz. The success was enormous, but the world of DXers was annoyed that it was only intended for those who participated in the contest.

These months of contact with this remote island, created more or less a "have-to-visit" St. Helena situation and, as you don't really like to travel by yourself, I more or less persuaded my friend Jan Tuner to be my travel-mate.

During our preparations before take-off in March 1993, we got the idea to initiate a yearly Radio St. Helena Day (this could of some comfort for those DXers who missed the broadcast in 1990).

After our arrival in Jamestown, we started to anchor our project.

We managed to open some doors within the community and, after a visit to the Governor Mr. Alan Hoole for his approval, it all started to come together for the first Radio St. Helena Day during the coming October.

As you know by now, the transmissions during these years have become very popular and a lot of radio-enthusiasts now have a verification card from this island in the South Atlantic Ocean. They also know that the island is lot more than "The Jail of Napoleon".

Another result of our visit was that we started to promote Radio St. Helena in various ways; we also started South Atlantic Travel & Trade (SATT) to promote future tourism on the island.

As we have good communications compared to St. Helena, we also act as an representative for Radio St. Helena.

SATT is a non-profit organization.

T-shirts (designed by the artist Hans Bradke, Germany) from this year's Radio St. Helena Day, can be ordered from:

SATT, Box 6014, S-60006 Norrkoping, Sweden, by sending 22 USD or 12 GBP in notes. Please state size (S=small, M=medium, L=large, XL=extra large, XXL=extra large).

Note 1: If anyone has comments or questions, please address your mail through me - I will pass it to John Ekwall for an answer/reply.

Note 2: A tape of the transmission, which was announced during the program, will be available around January 1995 for USD 10.

From: Lennart Deimert <lennart.deimert@swedx.ct.se>

An American point of view on...

SCANNERS, ENCRYPTION and TELEPHONES

By Richard Crisp

The subject of electronic privacy has been receiving an increased level of attention in the US in the last few years. A major reason for this activity is the widespread use of cellular and cordless telephones on the one hand, and the greatly increased popularity of scanning receivers or 'scanners' on the other. Fuelling the flames on both sides of the issue are well-publicised reports of embarrassing cellular telephone and other intercepts being made.

One example is the 1992 Governor's race in the State of Virginia wherein one of the campaign workers managed to intercept a 'compromising' analogue cellphone call made by the rival candidate. Other examples include the Prince of Wales being tape-recorded talking to his mistress on a cellphone. In Australia, few could forget the famous conversation alleged to have taken place between Andrew Peacock and Jeff Kennett.

While these stories make for tantalising copy in the press, the fact that prominent persons are being intercepted only underscores and focuses attention on the fact that analogue cellular, cordless and other radio-based telecommunications are easily intercepted, and that privacy is not a feature built into these systems.

An attempt to remedy the situation has resulted a number of laws enacted which restrict certain activities, certain types of equipment and yet fall short of providing the desired protection.

Despite the recent increase in awareness of the non-security of analogue cellular telephone conversations, the issue of legal restrictions on monitoring communications is considerable older...

History

It was during World War 1 that communications intelligence was first widely deployed. It was discovered in the early days of the war that enemy communications could be intercepted by a number of methods including radio techniques. It is beyond the scope of this article to get into this area, but a number of excellent books have been written on the subject of communications interceptions for military purposes.

Among those recommended are 'The Codebreakers' by Kahn and 'Puzzle Palace' by Bamford.

In the early 1930s the first comprehensive set of laws was enacted at the federal level in the United States which protected wire and other communications. This law was known as the Communications Act.

Cellular telephone legislation

There are many interesting aspects of how the cellular mobile telephone service (CMT) has come to shape the laws which apply to all US citizens and, in turn, other people in the world. One is that the frequency allocation for this service caused all television sets to be changed. It used to be that television sets sold in the US had UHF channel coverage from channels 14 through 83. Now, the spectrum allocation for CMT had to come from somewhere, so the television spectrum was compromised.

You can no longer purchase in the US a newly-manufactured TV which has the full 83-channel coverage. However, the older TVs are in use in millions of homes and can be used to monitor cellphone calls.

This brings us to the subject of the next major legislation that affected electronics communications, the Electronics Communications Privacy Act of 1986 (ECPA86). This law is probably one of the least enforceable laws in the entire US federal statutes. Put simply, it makes it illegal to listen to cellular telephone conversations if you are not a participant in the conversation!

It is truly amazing that such a law could be expected to be effective. How can such a law be enforced?

Note that this law did not ban the manufacture, sale or distribution of radio receivers capable of performing such monitoring, but it made it illegal to listen. With several tens of *millions* of older TV sets around capable of listening to CMT calls, it is amazing such a law could be passed.

The justification for the law was so that the equipment suppliers could tell their customers that the systems were secure and that they had no need to be concerned about security. Despite the fact that an old TV or a scanner could be used to monitor a cellphone call, the public was led to believe that their calls were secure at the worst and were not informed of the lack of any security at the best.

The Cellphone Problem

All went well for a few more years and then news reports about the Governor's race in Virginia mentioned earlier and the scandalous tape-recorded conversations of the heir to the British throne speaking to Camilla Parker-Bowles began to appear. Interestingly enough, while it would have been illegal to make such a tape in the US, the fact that it came from overseas apparently exempted it from the US law. In fact, an enterprising entrepreneur set up a telephone number where customers could pay to hear the entire conversation!

As a result of many of these events making it into the press and television, there became a feeling that something needed to be done to stop this blatant intrusion into people's private affairs. This takes us to the scanner ban of 1992.

Stated quite simply, the US Federal Communications Commission (FCC), the authority responsible for regulating communications in the US, is no longer permitted to 'type certify' scanning receivers capable of or readily modifiable to be capable of receiving cellular telephone calls.

Without type certification, no radio receiver (or other equipment requiring such certification) can be imported, distributed or sold in the US. The 1992 law defines a scanning receiver as a radio receiver capable of automatically tuning four or more frequencies per second.

This writer assumes that a manually-tuned receiver would slip through or even one that cannot scan automatically but could scan by being controlled by an external computer.

One has to wonder why cellphones themselves are not banned, as they too can automatically scan four or more frequencies per second and, in the case of some phones (such as the OKI 900 or NovAtel 390E) can be readily re-programmed to be nothing short of a cellphone scanner.

This fact was demonstrated to the US Congress during the public hearings leading to the passage of the law.

Since the very act of making such a demonstration was technically illegal, the engineer from a major Silicon Valley computer company (Sun Microsystems) demanded and received immunity from prosecution before he agreed to testify.

This author believes that, based on anecdotal accounts of the demonstration, the congressmen were so titillated by the content of the cellphone conversations they heard within the immediate area of the Capitol, they became convinced something had to be done to put a stop this sort of listening.

Apparently they were not sufficiently disturbed by the fact that they were possibly banning the very equipment whose use they were attempting to protect. The result was the cellphone-capable scanner ban of 1992 mentioned above.

Rational arguments can be put forth on both sides of the issue regarding the rights of users to be secure from unauthorised listeners versus the rights of people to listen to anything that is transmitted or broadcast.

The emotions behind both sides run deep, and it seems unlikely that either side is going to convince the other side of their fallacy.

Certainly it is possible to commit theft or fraud based on the information heard if the listener has that intent, and listens until hearing something such as a credit card number or insider information which could be useful for a stock trade.

Obviously this is a fact of the use of the technology and everyone who uses CMT should be aware that they may be monitored and should take appropriate precautions to protect sensitive information. It would be quite plausible that in certain areas where there is such a concentration of business use of cellphones that the temptation to commit these fraudulent acts would be irresistible to so-inclined individuals.

Obviously Wall Street or the Chicago Commodities trading areas would rank high on a target list. But it is important to recognise that this type of fraud is readily preventable by users aware of the fact that they can be readily monitored.

There is another aspect of theft and fraud involving cellphones which is not preventable by the cellphone user.

Rather, this is a fundamental flaw in the specification of the system and the design that implemented it.

This is the fact that the Electronic Serial Number (ESN) is broadcast in the clear from the telephone every time it is used. *(In Australia, this applies only to the older analogue 018 cellular phones.*

The newer 041 GSM digital phones, which cannot be monitored by conventional means, do not have an ESN. Instead, the identity of the user is recorded on a small chip which also identifies which of the three completely independent networks (Telecom, Optus or Vodaphone) will be used. Changing the card changes the frequency band, and consequently the network accessed by the phone. Ed.)

Every analogue cellphone has a unique ESN which is used to identify the phone involved in the call so that the appropriate account can be billed. If a thief had means for capturing these electronic equivalents of a credit card number, and for in turn modifying a cellphone to now bear these numbers, then they would have the means to make 'free' calls (to them, anyway!) which would be virtually untraceable.

The ugly fact is that this sort of piracy started becoming more and more common by the 1992-93 timeframe when a number of technical articles were published in the USA, exposing technical details of the operation of the cellphone system to the electronics enthusiast community.

The result is that a number of clever individuals have used computers, scanners, soundcards, software and custom-designed circuits to allow them to decode the digital data transmitted along with the voice information.

Many of these devices are used for simply logging the telephone numbers being called, the buttons pushed when cellphone users dial access codes and to follow or track the call as the call is passed from cell site to cell site.

Unfortunately some of the hackers engaged in this activity are collecting and putting to use the ESNs and are committing wholesale fraud against US cellphone service providers.

Industry estimates in 1994 are that the service providers are losing in excess of a million dollars per day in the US. In certain Asian countries such as Taiwan and the Philippines, estimates of as many as 80 per cent of the phones are fraudulently 'cloned'. Obviously this is turning into a problem which is rapidly getting out of control.

The US Digital Telephony Bill

In the latter part of 1994 a new law was passed in the USA, popularly known as the 'Digital Telephony Bill'.

The primary purpose of this bill is to force telephone companies to include the capability of wire-tapping any call law enforcement demands (after receiving necessary court authorisation) into all of their switching equipment.

With the widespread adoption of digital technology in telephone systems, the days of 'alligator-clipping' a tap to a pair of wires are gone forever. In fact, the systems must have the capability to support wire taps specifically designed in.

None of this has anything to do with scanners or cellphones, but another part of the Digital Telephony bill does.

There are two other provisions in this new bill that have a bearing on this article.

The first is a prohibition of the manufacture, sale or possession of a scanning receiver, and of hardware and software used to gain access to telecommunications services with fraudulent intent. The second is a provision to make listening to cordless phones as illegal as it is for cellular phones.

More on the second part later...

This bill was recently passed by both houses and is expected to be signed by US President Bill Clinton soon. It is not known at this time how the language will wind up being interpreted by the courts when the first indictment under the new act occurs.

Since this had not happened as of October 1994, let's attempt to predict what the language will be interpreted to mean.

Impact of the Digital Telephony Bill

Since data is carried on the airwaves in an analogue cellular call in a non-encrypted manner, it is a straightforward problem to capture and decode the phone's identifying information using only a radio receiver, a computer and a sound manipulation device such as a Sound Blaster device or its emulators, while the appropriate software will generally have been written from the 'ground-up' by the person interested in

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An American point of view on...

SCANNERS ENCRYPTION and TELEPHONES

(Continued from previous page...)

acquiring this sort of capability. The data is completely unprotected and it is up to the interceptor how they use it.

Since it appears that computers and scanners seem to be generally coupled together for acquiring this sort of sensitive data, it stands to reason that an aggressive prosecutor may construe possessing an interconnected computer and scanner as an attempt to commit cellphone piracy.

Until a criminal case is brought to court under this new law, it will be anyone's guess how the law will be interpreted in a court. One thing is clear — it is a very technical matter to clarify whether a scanner connected to a computer is being used in an illicit manner or if it is just a convenient way for the operator to keep and maintain and scan from an organised list of logs and frequencies. To further compound the problem, an illicit user may keep organised lists as well as commit piracy.

In many cases, the lawyers, judges and juries will be asked to deal with arcane topics not well understood by the general public. It is one thing to determine whether a gunman was trying to assault or whether he was actually trying to protect someone. Any person can understand these arguments, but to ask the average person on the street to decide if the computer and scanner configuration found when a defendant's premises were raided by the police was an illicit combination may be more than can be reliably delivered.

As previously mentioned, the Digital Telephony Bill also makes monitoring of cordless telephones illegal. Previously it had been ruled in federal courts that users of cordless telephones had no reasonable expectation of privacy. They asserted that, since the signal was not encrypted, there was no reason to assume it was secure.

The reason for the decision was that a US taxpayer had been taken to court by the Internal Revenue Service (IRS, the US tax collection agency) and a case was built against the taxpayer which relied on evidence gathered by field agents monitoring cordless telephone conversations. The citizen asserted that the government agents could not use the evidence gathered in this manner as it was obtained without the benefit of a wire tap warrant, and therefore was not legally collected and must be excluded.

Note that the Judicial decision is apparently at odds with the philosophy held by the Congress. Other than the fact that cellphones and cordless phones differ in their effective range, the frequencies they use and a few other technical details, there is really no difference in the level of security one offers over the other. However, the US Congress apparently believed in 1986 that passing a law making it illegal to listen to cellphones would assure the security of cordless phones. On the other hand, the Judiciary had ruled that unencrypted cordless phone users have no expectation of privacy.

Since the 1986 cellphone listening ban was later strengthened in 1992 to prohibit the type certification of scanning receivers capable of picking up cellphone conversations, it is reasonable to assume that cordless phones will be provided the same additional protection in the future. After all, the goal of the cordless phone protection in the DT bill was to provide the same protection provided by the law to users of cellphones. It will be interesting to see if it takes six years — as it did for cellphones — or if it happens sooner.

Why the cellphone industry bears much of the responsibility

When the Cellphone system had its specifications established there was no provision included for protecting the Electronic Serial Numbers or for providing for privacy of the conversations carried.

Users expect privacy so the CTIA was employed to get legislation passed to make it a crime to listen to cellphone conversations. Any rational person would recognise that simply having a law on the books does not necessarily prevent an act from occurring, it simply makes it a crime. Furthermore, the very fact that the US federal courts have ruled that users of cordless (not cellular) should have no expectation of privacy because no feature to assure security is incorporated. So the conclusion from the courts is that, if you don't scramble or encrypt the conversation, then don't expect it to be private.

It seems bizarre that anyone would expect privacy just because a law saying you cannot listen is passed. If a person were to yell across the street to an associate and tell others to not listen, it would be foolhardy to assume that the persons asked to not listen would not be listening.

Regarding the ESN issue, it is this writer's opinion that the cellphone system designers or equipment manufacturers have been criminally negligent by not protecting sensitive information which, when compromised, invites fraud. To permit ESNs to be broadcast in the clear is no less negligent than publishing lists of valid credit card numbers and distributing them to the general public on demand!

To rely on laws to protect the integrity of the ESNs appears to be analogous to shopkeepers refusing to put locks on the doors of their businesses and getting a law passed which keeps you from going out of your house at night. It may be possible to prevent theft from the stores this way, but it is not the most effective way to solve the problem and it has some serious constitutional problems associated with it.

Why did the government allow the system to work this way

Clearly the US government *could* have demanded that the cellphone system be protected from unauthorised access, *could* have demanded encrypted voice and *could* have demanded that ESNs be protected from pirates. It didn't. Why it did not is an interesting question...

One thing the government has come to realise is that the microprocessor revolution and microelectronics in general has enabled the development and widespread deployment of cheap hard cryptography. From its perspective, it feels that it must have the capability to monitor and decrypt any and all communications in the world.

Obviously it is difficult to get foreign governments to provide the keys for breaking their sensitive codes, but at home, the government has far more influence.

Certainly the law enforcement authorities in the US are not happy if they cannot listen to any and all conversations carried by the common carriers, be they cellphone service providers or landline services. Sufficient proof of this lies in the arguments put forth by the government in its failed attempt to get the Clipper technology adopted by the force of law. Its arguments were that it had to

be able to break encrypted conversations to safeguard the security of the country, that the Clipper method provided security to the users from eavesdroppers, that unless the proper court-authorised procedures were followed, the codes could not be broken, and that its need to be able to break the codes was satisfied.

The US public and private industry patently rejected the proposal, citing the fact that when given a choice between a government-crackable and a non-guaranteed government-crackable code, users would select the latter and not the former. Furthermore, in a rather embarrassing incident for the Clinton Administration, a team of researchers at Bell Labs led by Matt Blaze actually showed how the *Clipper solution could be compromised by creating a bogus ID field which would not permit the government key escrow system to work, yet allow messages to be passed by the chips as if the keys were not corrupted.

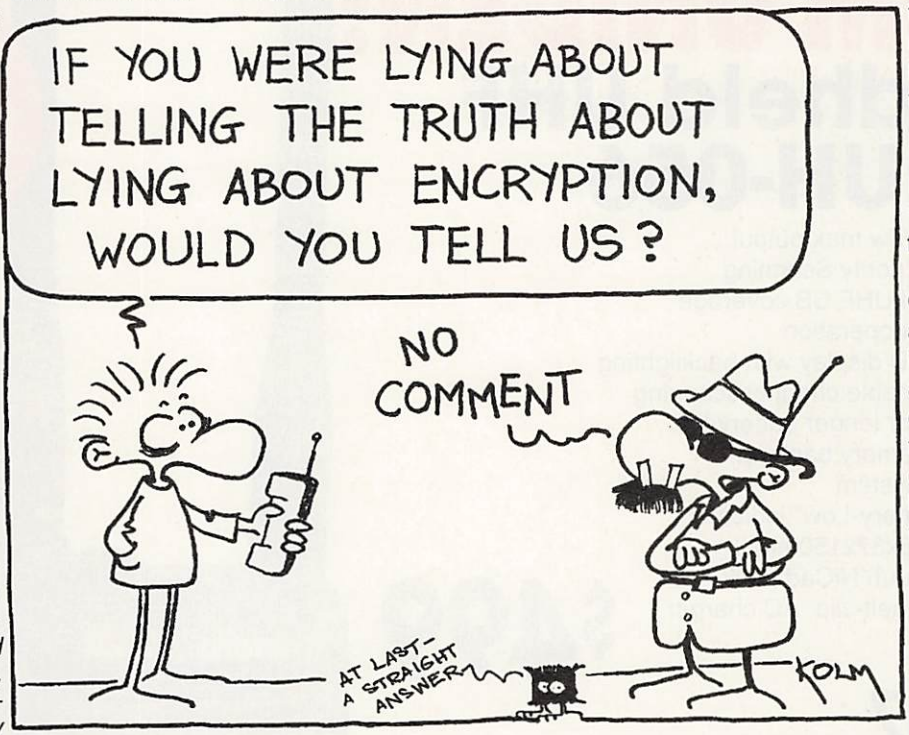
*(*Clipper is a proposal which is a silicon implementation of the NSA developed Skipjack algorithm. This is an encryption mechanism that offers good security to the users, but maintains the ability to be decrypted by the government.*

Basically there are two ways to decrypt it: one is the way used by the users, and the other "master key" method is reserved for government use. The master key is in fact two half-keys that must be combined in a particular way to be useful at decrypting. The deployment scheme was to split the key into its two parts and put separate government agencies in charge of safeguarding the keys. Only when a proper court order was issued could the two agencies deliver their respective key parts.

The basic concept of having two or more key parts that must be combined to permit government decryption is referred to as Key Escrow.

The problem with the Clipper method is that there was a special field appended to each encrypted "chunk" or packet of data. This field provided information relating to how to identify the proper key parts to permit the key escrowed system to be utilized. Matt Blaze and some other ATT/Bell-Labs researchers determined that this field could be forged and the Clipper phones will still work for the users but the key escrow mechanism would be rendered useless).

Despite this key flaw, the Clinton Administration pressed on and was eventually defeated on this proposal. The fact that the Clinton Administration did not withdraw the proposal makes many observers suspicious that there are other, non-publicised ways to decrypt Clipper encryption.


IF YOU WERE LYING ABOUT TELLING THE TRUTH ABOUT LYING ABOUT ENCRYPTION, WOULD YOU TELL US?
NO COMMENT
AT LAST - A STRAIGHT ANSWER
KOLM

If these suspicions are true, then it implies that the safeguards advertised that prevent unauthorised government eavesdropping may be bypassed by using the alternate scheme.

Clearly the government would not like to see the US cellphone system deployed with voice encryption. If it was, and if it were not a breakable system, enforcement agencies would not be able to monitor conversations, even if they had a court order. This is a totally unacceptable scenario from a law enforcement perspective.

For this reason it is often suspected that these agencies prevented the system from being approved with anything other than clear voice transmissions. In exchange, they offered a law making listening to cellphones a crime. This would offer the cellphone providers a plausible-sounding story to tell to the customer who is concerned about security.

Of course, the 1986 law is not effective and, as mentioned earlier, even old TVs can pick up the calls. So the next step was taken in the passage of the scanner ban of 1992. Finally, the Digital Telephony Bill was passed in 1994 to provide further 'protection' to both the ESNs of cellphone and the voice content of cordless phones. We can see that if the public is satisfied that its conversations are secure, it will not demand encryption.

By stalling the inevitable demand for encryption (which will happen once customers finally determine they are being monitored) the government presumably will have time to get legislation in place to control encryption technologies.

Louis Freeh, Bill Clinton's appointee as Director of the FBI, recently told an international conference on cryptography that if the government cannot break codes in the future being used in the US to safeguard conversations and data, that the FBI is prepared to pursue making it illegal to use unbreakable codes. Given the prevailing sentiment in Washington these days, the FBI may well be successful. So it would appear that an unworkably insecure system was permitted to be deployed, that a number of patchwork laws were passed to attempt to rectify the fundamental security shortcomings of the analogue cellphone system, and in the process the government has established a potentially dangerous and unjust legal structure which is open for abuse. It appears this was permitted to happen to buy time for the government to get regulations passed to control encryption technology.

It is clear that Orwell *was* right about the future — only he was 10 years early! 1994 is here.

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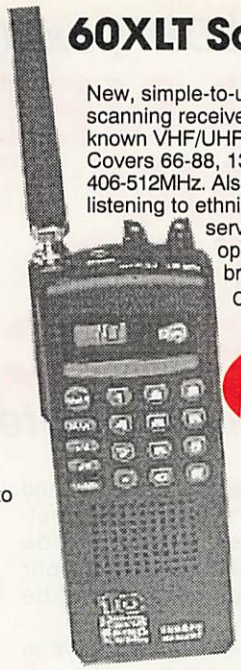

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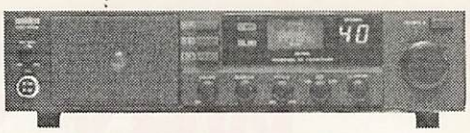

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B 1848

Paul Butler, VK3DBP, explains....

WHY YOU NEED TO KNOW RADIO THEORY TO OBTAIN AN AMATEUR LICENCE

Continuing the Novice Notes Series

CB Action's Novice Notes have been around for quite a while now, so it's time to think again about WHY anyone would bother going to all that trouble to get an amateur radio licence. After all, it takes quite a lot of effort to get up to speed on regulations, Morse and theory. What's the point...?

Well, this is a great time to consider joining the ranks of the several millions of amateur radio operators around the world, people who gain a great deal of pleasure and satisfaction from their hobby. The path into amateur radio is really quite easy to follow, because of the introduction of simple licence classes which act as stepping stones towards the 'full call'.

Morse Code, once a real barrier for many people, is not required for certain classes of licence. And the examination procedure itself is simple and much more flexible than it used to be. It certainly is a good time to get started — after all, if you start now, you could be a fully licensed amateur operator in time for the next solar maximum!

But why should you bother? What is to be gained by slogging through a theory course, reading textbooks, boning up on regulations? Well, the simple answer is that **you can do so much more** when you're an amateur operator! There are *more* bands and frequencies for you to work, *more* modes with which to communicate, *more* organised activities to take part in — *more* of the world waiting for you.

Several classes of licence are currently available to you as a potential amateur radio operator. The simplest way in is through the Novice Amateur Operator's Certificate (NAOCP), for which you will sit a multiple-choice theory exam, a regulations exam and a 5 words-per-minute Morse test. With the proposal for a no-code licence under consideration, your entry into amateur radio could be even easier.

There are essentially two ways to tackle the Novice syllabus. The bottom-up method starts with AC and DC circuits and the discrete components end of things, gradually building up the picture to include whole systems such as receivers, transmitters and so on.

The alternative, and the way we tend to go in Novice Notes, is from the top down. We look at whole systems, like receivers and transmitters. Then we pull these systems apart (not literally) and see what makes them tick.

What exactly is the full-call (AOCP) amateur operator allowed to do that the Novice (NAOCP) cannot do? Why, spend the time and effort studying for the exam, and getting Morse sending and receiving up to a higher speed, if you already hold a Novice licence? And anyway, is the Morse really necessary?

The exam you will take, in the not *too* distant future, will require you to understand amateur radio at both levels. A lot of new ideas are introduced at each stage but don't panic if everything seems too much. As the whole picture emerges, each part will make more and more sense.

Don't expect to find all the answers in Novice Notes, either. You will need to read around the subject a bit — try some of the Wireless Institute of Australia books or those put out by the American Radio Relay League (ARRL).

What about the next stage, the 'full-call' or Amateur Radio Operator's Certificate of Proficiency (AOCP)? This seems light years away when you're still boning up for the Novice exam. But why not consider the next stage? Once you've got the basics, it's possible to keep going for the lot.

:Not me!", do {I hear you say? "Full call — *far* too hard. *And* you have to do 10 words per minute Morse — why would anyone bother?'

What exactly is the full-call (AOCP) amateur operator allowed to do that the Novice (NAOCP) cannot do? Why, spend the time and effort studying for the exam, and getting Morse sending and receiving up to a higher speed, if you already hold a Novice licence? And anyway, the Morse really necessary?

These are common questions, and we try to answer them in the pages of CB Action. In the final analysis, of course, it's *your* decision whether to push on to AOCP — but if you do decide to go ahead, you will certainly find the exercise challenging and rewarding. Isn't that enough to make you want to get started?

The first difference between a full-call operator and a Novice operator concerns the power of transmissions. A limit of 30 watts peak power is imposed on Novices when using single sideband (SSB) voice transmissions, and this is reduced to 10 watts mean power when using any other mode of transmission. A so-called Unrestricted (full-call) operator is, in fact, still limited in power but the limits are increased to 400 watts peak

power for SSB voice and 120 watts mean power for other modes.

By way of an aside, this gives me a chance to get on my soap-box and make it clear where I stand on power levels. Modern electronic equipment copes easily with producing radio frequency power up to (and way beyond) the limits imposed on amateur radio operators. It is quite easy, therefore, as long as one has lots of dollars, to go out and buy a 'black box' to plug into the mains supply and produce the maximum power. More dollars will buy a multi-element antenna, tower and rotator and the whole lot will just about burn holes in the ionosphere in the search for yet another '5 and 20 over 9' signal report from the other side of the world!

The down-side of this is that those of us who choose to radiate much less power, for personal, financial or technical reasons, are often swamped by the 'big boys', to many (okay, not all) of whom anything less than telephone quality does not count as a contact.

Clearly, power limits are *maximum* levels, not *required* levels. (Something like the road speed limit.) The spirit of amateur radio, to me at least, is to experiment with ways of making contacts using the least amount of power, not the most. And it certainly states in the 'rules' that we are expected to minimise interference to other stations. How can the 'power towers' do that when they are pumping what seems like megawatts over the top of the lower power stations?

As a result of the trend to high power in amateur radio, the Novice operator certainly has to work harder to get through, but that is surely no bad thing. However, the higher permitted power levels can be of benefit if used sensibly and so that is one reason for heading for the full-call ticket.

The next reason is to do with the frequencies available to different classes of amateurs. A Novice operator is restricted to parts of four bands, three on HF and one on VHF. These have been chosen to give reasonable access to both local and distant stations. There is real benefit to be derived, however, from having access to a wider range of frequencies, including the following:

- propagation conditions will usually favor one or two bands over the others at any particular time, and so the possibilities for effective operating increase if a wider choice is available;
- certain operating modes are found only on certain bands and so a wider choice of bands opens up new ways to communicate;
- more frequencies available means more ways to experiment with transmitters, receivers, antennas and so on;
- contest operation can become more challenging with more bands to work, including possibilities for cross-band operation; and
- more bands mean more space, so if one band is crowded out, moving to another may help (eg 70cm is always less crowded than 2m).

Related to the bands available to the full-call amateur operator are the modes of operation which may be employed on them. As a Novice operator, you are restricted to telegraphy (Morse Code) and sideband or AM telephony (speech) on the novice HF bands, together with FM telephony on part of the 2m VHF band. Only by upgrading to a full AOCP (or to a Limited call) will you be able to take full advantage of all the exotic data modes such as packet, radioteletype, AMTOR, slow- and fast-scan television. This will mean more ways to communicate, more ways to experiment, more ways to enjoy your hobby.

The point often raised about telegraphy requirements in the licensing system is addressed to some extent by the existence of the Limited call mentioned above. The holder of a Limited Amateur Operators Certificate of Proficiency (LAOCP) must satisfy the same technical and regulations examination requirements as the full-call amateur but is not required to pass a Morse test. This no-code licence is very attractive to many amateurs, as it provides access to all bands from 50 MHz upwards and all the telegraphy, telephony and data modes of operation.

One further possibility is to add together the full theory exam, the regulations exam and the 5 words per minute Novice morse exam to gain the Combined (Limited & Novice) certificate. This combines the 50 MHz and up privileges of the Limited operator with Novice operator's access to some of the HF bands.

Whichever way you look at it, there are clear advantages in upgrading from the Novice theory level to the full theory level. Whether you choose to go for the higher telegraphy or not is a separate issue — if you do, there will be more privileges available to you.

So, that's decided — you're going on to NAOCP, then AOCP. Let's get on with this month's theory, then, and see WHY access to a wide range of high frequency (HF) bands gives you so much more. A couple of years ago, in the early days of Novice Notes, we looked at how radio waves get themselves around the world. Let's revisit the theory and see the range of possibilities presented to an NAOCP or AOCP amateur operator.....

HF propagation

The ability of high-frequency (HF) radio waves to travel long distances is a result of bending in the **ionosphere**, a region of the earth's atmosphere between 50 and 400 kilometres high. The density of charged particles in the ionosphere can be high enough to affect radio waves, particularly frequencies below 30 MHz, often bending them enough to return to earth.

In this way, radio signals can 'propagate' beyond the visible horizon. Depending on the frequency in use and the time of day, ionospheric propagation can provide communication from short range, as little as 100 km, to long range, more than 10,000 km, or to the other side of the globe.

The bending produced by the ionosphere causes radio waves to behave as if they had been reflected from a definite boundary at a particular height. The height of this theoretical layer, which would have the same effect on the radio waves as the gradual bending that in fact takes place, is called the **virtual height**. The ionosphere consists of distinct layers, which determine the virtual height for given conditions:

- The **D layer** is closest to the earth's surface (70-90 km high) and its behavior depends directly on the intensity of the sun's rays. Its effects are most noticeable, therefore, during the day. The lowest frequencies used by amateurs (1.8 and 3.5 MHz) are almost totally absorbed by the D layer, making such low frequencies of little use during daylight hours.
- The **E layer** (100-120 km high) is the lowest layer of the ionosphere which can bend radio waves enough to return them to earth. This depends on the presence of sunlight and ionisation is at a maximum at midday, disappearing soon after sunset. So-called sporadic-E propagation, which is important at frequencies above 21 MHz and at VHF, is a result of relatively dense patches of ionisation

....☞

WHY YOU NEED TO KNOW RADIO THEORY TO OBTAIN AN AMATEUR LICENCE

(Continued from previous page...)

which drift around within the E layer.

• Unlike the D and E layers, the **F layer** (140-400 km high) is present all the time, although its properties vary quite radically over the 24-hour period of each day. With the arrival of the sun's rays at sunrise, the degree of ionisation in the F layer rises rapidly from its daily minimum value.

The peak of ionisation is reached by mid-afternoon, but decays slowly during night-time, returning to the daily low in time for the next sunrise. The slow rate of recombination of electrons and ions in the F layer is a result of the lower densities and pressures found in the higher regions of the earth's atmosphere.

Although regarded as a single layer during darkness, the F layer is treated as two separate layers during the day. The **F1 layer** (140-190 km high) is not important for radio propagation and disappears soon after sunset. By contrast, the **F2 layer** is the most important part of the ionosphere for amateur HF communications. It can provide communication by single hops up to about 4000 km each and even greater distances can be achieved by multi-hop propagation.

The band of frequencies useable for communication between two points varies constantly throughout the day and is often described in terms of the **Maximum Useable Frequency** (**MUF**) and **Lowest Useable Frequency** (**LUF**). Both are linked closely to the position and state of the sun, since these factors determine the ionisation state of each layer of the ionosphere.

The values of MUF and LUF depend on the particular propagation path considered, so communication conditions to Europe at any given time may be very different from those to North America.

The clearest cycle in propagation conditions is determined by the relative position of the sun in the sky. Superimposed over this regular day-night cycle are short-term variations due to the rotation of the sun, annual seasonal variations and, most importantly, long-term changes due to the sun-spot cycle.

Observations over many decades have shown a strong link between the number of disturbances (sunspots) on the surface of the sun and the effectiveness of radio propagation. Quite regular variations in sunspot numbers follow a cycle lasting about 11 years, and HF propagation is best when the sunspot activity is greatest (we are now heading straight into a sunspot *minimum* — bad luck!). It is difficult to predict the extent of a sunspot maximum and so reliable HF communication requires a mixture of mathematics and guesswork.

Two types of solar emission affect the ionosphere and therefore propagation — electromagnetic emissions, including X-rays, ultraviolet (UV) and extreme ultraviolet (EUV), and particle emissions, including high-energy protons and alpha particles and low-energy protons and electrons. Because the different types of emissions travel at different speeds through space, a given solar disturbance can have varying effects on skywave propagation.

Electromagnetic radiation, travelling at the speed of light, arrives first. The EUV ionises the F layer and so active sunspots enhance HF communication. But UV and X-rays ionise the D layer, causing increased loss of signal for paths crossing daylight areas. Next comes the high-energy particles, often several hours behind the electromagnetic radiation, producing much higher absorption in the earth's polar regions and creating radiation hazards to people and satellites in orbit. Finally, as long as 40 hours after the electromagnetic radiation, the low-energy particles arrive and cause magnetic disturbances, auroras, sporadic E and increased polar absorption.

Now let's look at the actual path of a radio wave on its way from transmitter to receiver and learn a few definitions:

• The angle above the horizon of the transmitted wave is called the **radiation angle**. The smaller this angle, the less refraction is needed to bring the ray back to earth. This is why HF antennas are designed with low radiation angle in mind.

• At high radiation angles, radio waves pass straight through the ionosphere and are lost into space. The angle at which just enough refraction takes place to bring the wave back to earth is called the **critical angle**.

• In the region between the point at which this wave first returns to the surface and the limits of the ground wave, no signal will be heard. This is the **skip zone** and the distance from the transmitter to this point is the **skip distance**.

A **great circle** is any circle drawn on a sphere with its center at the center of the sphere. The equator, for example, along with all lines of longitude and many other possible imaginary lines on the surface of the earth are all great circles. Radio waves propagate via a direct route between two points, that is, along a great-circle path.

Propagation can take place in either direction around the earth. The shortest part of the great circle which passes through both transmitter and receiver is called the **short path**, while the other, longer part is the **long path**. Long path and short path directions are always 180 degrees apart and conditions often favor one over the other. To take advantage of particular paths, a directional antenna is needed.

A radio wave may reach the receiving antenna by two different paths. If one path takes longer than the other, the signals may arrive out of step (phase) with one another and cancel partially or totally. Because the degree of cancellation varies over time, the received signal will fade in and out. Because of the behavior of radio waves and their interaction with the earth and its atmosphere, each segment of the radio spectrum will have different properties. Here, then, is a reminder about the properties of each of the amateur HF bands:

The 1.8 MHz (**160m**) band or 'top band'

Because of D layer absorption, propagation during the day is limited to about 120 km. At night, when the D layer weakens, signals will travel thousands of kilometres.

The 3.5 MHz (**80m**) band

Signals in this band travel further during the day than those on 160m. Daytime absorption restricts the range during the day to about 400 km. At night, communication is possible around the world.

The 7 MHz (**40m**) band

Typical range during the day is about 800 km, but at night worldwide communication is possible. The night-time skip distance is about 500 km.

The 10 MHz (**30m**) band

Lying between the low frequency and high frequency bands, this band

has characteristics of both and provides 24-hour use. Communication over 1600 km is not unusual during the day and signals at night provide world coverage. This band is least susceptible to changes in conditions due to the solar cycle.

The 14 MHz (**20m**) band

This is possibly the most popular amateur band for long-distance communication. It shows sizeable skip distances (day 800 km; night 1600 km) but offers worldwide daytime communication and low levels of atmospheric noise.

The 18 MHz (**17m**) band

During solar maxima, the 17m band supports reliable long-range communication during the day, continuing well after sunset.

As the solar activity decreases, the band opens only during daylight hours. At solar minima, the band is of limited use.

The 21 MHz (**15m**) band

This band provides good communication almost 24 hours a day at times of peak solar activity but hardly opens at all during solar minima.

The 24 MHz (**12m**) band

The 12m band continues to offer daytime communication even during low and medium sunspot activity but solar maxima result in long-distance contacts well into the night.

The 28 MHz (**10m**) band

When the 10m band is good, it is very good. But when it is bad, it is awful! During solar maxima, long distance contacts are possible at quite low power levels, even extending beyond sunset. During a solar minimum, 10m appears dead, apart from a few openings due to sporadic E, meteor scatter and so on.

The 50-54 MHz (**6m**) band

For many enthusiasts, the 6m band provides all the challenges an amateur needs, because all propagation modes are represented at some time or another.

Even at the worst times, contacts over hundreds of kilometres are possible. Sporadic E helps things along, increasing the range to as much as 2000 km using single-hop paths and further with multi-hop paths.

At peak sunspot times, communication is possible around the world but can be transient and subject to extreme local variations.

The 144-148 MHz (**2m**) band

Tropospheric ducting becomes very important at these frequencies, providing paths as long as 4000 km over water but ionospheric effects can play a part, too. Sporadic E paths are possible but are not as common as on 6m. Auroras and meteors can provide transient communication paths in this band.

The 420-450 MHz (**70 cm**) band

This is the highest band of frequencies used by amateurs which shows significant ionospheric effects, including aurora propagation and meteor scatter. Tropospheric ducting can significantly extend the range of a UHF station well over 1000 km.

All these bands are waiting for you to get your ticket — into the Novice Notes, then get your Novice licence — and remember, your full call is just around the corner!

Here's a few questions this month for you to think about:

1. The absorption of radio waves by the ionosphere depends on their:
(a) frequency
(b) amplitude
(c) velocity
(d) phase

2. Radio frequency waves travel in free space at a speed of:
(a) 300,000 metres per second
(b) 3,000,000,000 metres per second
(c) 300,000 km per second
(d) 3,000km per second

3. Long distance high-frequency communication at night is normally via the ionospheric:
(a) D layer
(b) F layer
(c) E layer
(d) N layer

4. At night, the ionosphere normally consists of:
(a) F layer
(b) D and E layers
(c) E and F layers
(d) the D layer only

5. Transmission of high frequency signals over long distances is generally due to:
(a) surface wave propagation
(b) ground wave propagation
(c) sky wave propagation
(d) direct propagation

Answers: 1(a), 2(c), 3(b), 4(a), 5(c).

That's all for this month. Cheers and 73s from Paul, VK3DBP.

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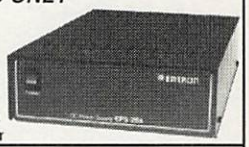

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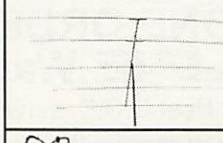

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See Page 10 For More

Letters...

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WHY NO 27MHz RIG REVIEWS

I am a fairly recent newcomer to the CB scene and was probably one of the last "noddies" to actually pay for my licence before the SMA disbanded the system.

I have, however, been buying CBA for several years and I have noticed that the magazine has almost completely changed direction - away from CB and towards almost everything else.

The one big thing that I miss are the reviews of new 27MHz rigs - particularly the AM/SSB ones. I know you ran a review of an Hatadi AM thing a couple of issues back but candidly I couldn't care less about "AM only" radios.

I also noted in the last issue that the DX propagation chart was missing and I hope that it's back in the next one. I really enjoy working DX but haven't heard much (I'm restricted to legal channels) and get very envious when I read Jack Haden's DX International column about what he's been hearing - how come I can't hear them - are they all on illegal channels or what?

Jeremy Ross, Brighton, Vic.

The unfortunate facts of life at the moment are that there have been no new AM/SSB rigs released for some considerable time and DX propagation is so poor that it is simply not worthwhile running the DX charts.

DX at this time, and for some time to come, is very much a case of being in the right place at the right time and yes, that probably means listening above the legal channels - but not into the amateur allocated 10 metre (28MHz) section.

Like it or not, most serious DXers, both here and overseas, take the chance of prosecution by using amateur transceivers and these are the stations still working international DX.

Yes, of course it's illegal and you face fines and forfeiture of equipment if caught - but many still tempt fate.

We have made a deliberate choice in introducing much more than "just CB" into the magazine.

The recent survey indicated a huge number of readers who were interested in things other than CB and as a result we have simply broadened the scope to include these interests. Rest assured that when new CBs are released you will read the reviews in CBA.

Editor.

GME-ELECTROPHONE TX4000

Re: Your November/December 1994 issue of CB Action

I would like to comment on a couple of the issues regarding the GME Electrophone TX4000 UHF mobile CB transceiver raised by Ken Reynolds during his review of the new UHF handheld transceiver product releases.

The review itself dedicates quite a lot of comment to the onset of "built-in" selective calling and we, as manufacturers, are very proud of our achievement of being the first supplier to recognise the benefits of this feature to all UHF CB users and its subsequent acceptance by other suppliers.

As is the case with all our new product developments, the TX4000 and the selective calling feature underwent a vast amount of market research via our Australia-wide dealer network, as I am sure Ken would recollect, during its design phase in 1990/1991. From that feed-back and our own experience, it was decided at that time to present it in the currently-available format.

In order to present an effective and efficient signalling system, it was decided that the programming of 1 or 2 digits was hopelessly inadequate and that 4 digits would meet most customers' needs, by allowing 9,999 different codes. It is important to also note at this time that the major benefit of selective calling is to provide for quiet operation of the radio if and when required, as well as the encoding of numerous numbers.

We were also concerned at the unknown impact that full five-tone programming may have on existing signalling systems, given that every new TX4000 transceiver to be sold would come complete with a fully functional signalling system.

Additionally, we felt at that time that we should reserve the first digit for special applications (should they be SMA type approved) such as telemetry and simple security systems. We did, however, as stated in Ken's article, provide a software programming kit for our dealers to meet the needs of their customers should the fixed first digit (as it is delivered from the factory) prove to be impractical. A number of technical issues also governed our decision. The TX4000 liquid crystal display, in particular, would be affected, as with the addition of an extra icon to accommodate the first digit would affect its size and result in a limited viewing angle for our customers.

Ken also made mention of the group calling facility offered by the GME TX4000, as well as other suppliers' products.

As noted by Ken, the TX4000 utilises the international standard CCIR prescribed tones and there is an option within the standard for various tone periods (tone lengths). As the TX4000 is an Australian-manufactured product and the UHF 40 channel CB service peculiar to Australia, we decided that the appropriate signalling format to follow for the TX4000 should accommodate 5-tone systems relevant to existing five-tone systems and our earlier UHF CB model, the TX472S. The signalling system used in the TX472S was provided for us by Signalling Technologies Pty. Ltd. (Sigtec), an Australian company specialising in a range of signalling products.

As stated in the article, Australia uses an extended time period for the group calling function. It is this approach which allows the TX4000 and GME Electrophone to give a true meaning to an old marketing adage, "Made in Australia for Australian conditions", for the group calling function. This was utilised in the TX4000, making it compatible with the earlier TX472S, most Sigtec encoder/decoders and most other UHF products utilising Sigtec selective calling options.

Thanks for a very good magazine and your promotion of the CB market at large.

Standard Communications Pty. Ltd.
Gary Cross 2-Way Communications & GPS Product Manager

A number of reader's letters have been held over due to space limitations - they will appear in the next issue of CBA....Editor..

REVIEWING THE NEW AOR AR-8000

"It does it all..."

By Russell Bryant

It does it all! The scanner scene is about to be revolutionised with the AR-8000 hand-held powerhouse. Scanners have cone along way since their introduction in the late '60s. Today the AR-8000 takes receiver technology several steps further.

It wasn't all that long ago that a parcel containing the AR-1500 hand-held scanner arrived on my door step. As I sat playing with the radio I thought, "...it's going to be hard to beat this...". After all, it received all frequencies between 500 kHz and 1500 MHz, without interruption. The AR-1500 could handle AM, SSB, FM and WFM, plus it featured the now expected 1000 memory channels.

One thing the AR-1500 lacked, however, was the ability to tune SSB transmissions in 50 or 100 Hz steps. The lowest increment available was 5 kHz which, at the time, did not detract from the receiver because it supported an excellent BFO. But still, accuracy did suffer a little.

Market leaders

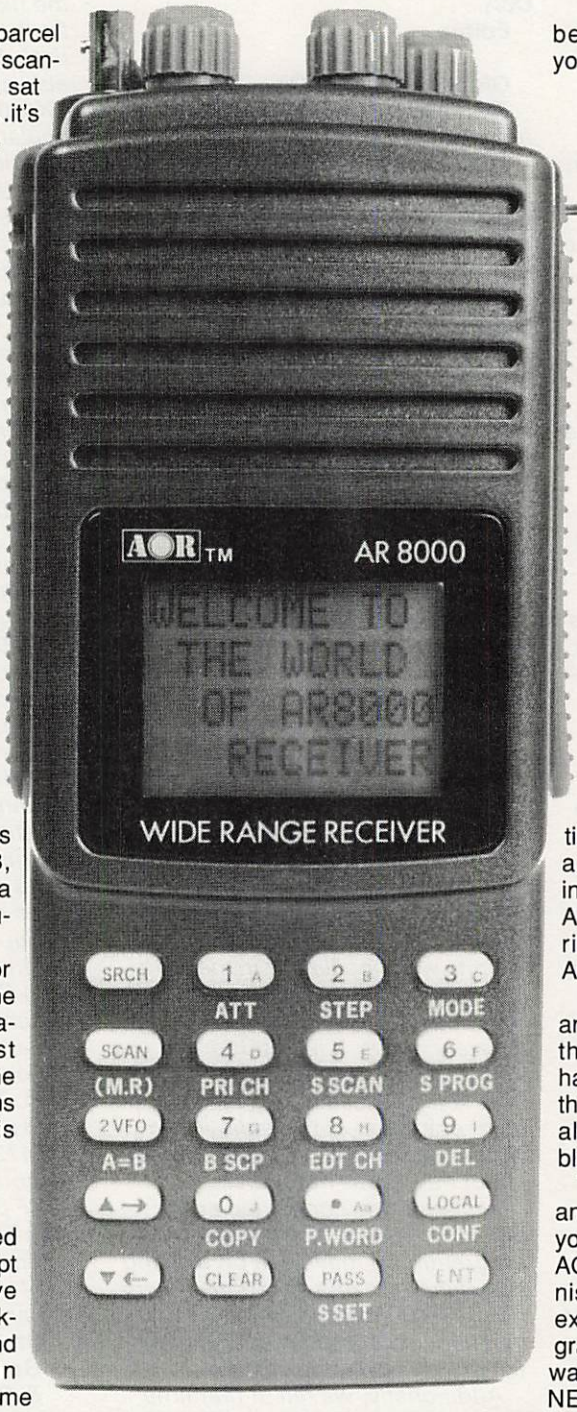
The AR-1500 gave the AOR factory market leadership over its now familiar rival Yupiteru. The victory was short-lived however, as Yupiteru countered shortly afterwards with the MVT-7100. This radio had all the features of the AR-1500 plus a few more. What put it above the AOR was its 50 or 100 Hz resolution of SSB, thereby eliminating the need for a BFO, as well as displaying an accurate frequency readout.

All that is now ancient history, for we, the scanner users, are about the be blasted out of our safe, complacent little worlds into the 21st Century. Here I sit, playing with the AR-8000 hand-held communications receiver and, dare I say it... it is going to be hard to beat this.

All new, all powerful...

The AR-8000 is *not* an upgraded AR-1500. It is a totally new concept in scanner (although I put it above being a scanner) design. It is chockfull of features, functions and bit and pieces previously found only in receivers like the AR-3000. In some respects it exceeds that of the AR-3000, but more on that later.

So where do we start? I suppose a brief description, as the AR-8000 is not all that big, especially when measuring it against what it can do. The newest AOR stands 152mm high without the antenna attached, it is a touch on the wide side at 69mm, but it comes in at a fairly well standard 40mm thick. And, at just over 400g fully loaded, it is not that heavy. The AR-8000's cabinet is a pleasing ash grey shade, and it fits snugly into the average hand. Some rather beefy non-slip rubberised protrusions occupy about half the sides of the case. This gives the user a sense of sturdiness when it's being used hand-held, especially if you're wearing gloves.



A third by a third...

The front of the radio is most easily, for the sake of written description, divided into thirds. The bottom third is the keyboard — no real surprises here, although there are a few keys that bear investigation. Located above the keyboard, in the next third, is a four-line multi-function LCD dot matrix display. What a busy little place this is going to be for the first-time user! But, after just a few minutes of tinkering and a few trips to the handbook, it all makes sense. The small but effective speaker completes the overall attractive business side of the radio. Apart from the soft touch keys, the AR-8000 has only three moving parts — the volume and squelch controls and a dial. The dial is used to select all features and functions from the various menus. These are of course displayed on the LCD.

Don't forget the book!

Before proceeding into the operation and performance of the AR-8000, a word of caution to everyone, including those 'top gun' scanner users: the AR-8000 is all new. Nothing has carried over from any of the previous AORs released here in Australia.

Forget all you have retained about any other scanner sold. It is mandatory that the user, be they novice or old hand, *read the handbook*. Failure to do this will result in the AOR not delivering all. You have been warned, so don't blame the receiver if you stuff up.

Turn the AR-8000 on for the first time, and it requests at which level of entry you wish to access the features that the AOR offers. As a newcomer or a scannist or someone with limited scanner experience, the AR-8000 can be programmed at NEWUSER (which, by the way, is the default setting) level. As a NEWUSER you are presented with a smaller number of options and features, thereby simplifying operation and lessening the learning hurdle.

When you've mastered the basics, and are confident that the term EXPERT

better suits your level of expertise, then stand by to be stunned. All manner of controls can be exercised over what seems a multitude of attributes. I doubt there is little that the expert user cannot alter, modify or re-write to memory. While on the subject of memories, we have become used to scanners supporting 1000 channels these days. Typically, this is presented as 1000 memories divided into 10 banks of 100, which provides a convenient method of housekeeping. One bank for police, one for ambulance and another for whatever takes your fancy, for example. The AR-8000 departs from the norm yet again. This time AOR's R & D people have partitioned the channels even further. You get 50 banks of 20 instead, offering an even more convenient catalogue of channels.

Two VFOs

Having set the degree of expertise required, you then discover that the dot matrix display now shows *two* VFO frequencies. Now this is a handy quality indeed, since you can now toggle between two frequencies as simply as pushing a button. If you needed to listen to the input side of a repeater as well as its output, you can. Entering a frequency into VFO is simple: frequency followed by ENTer. If the mode of reception is not what you want, FUNCtion then MODE key (which doubles as the 3 or C key), allows the correct or desired mode to be selected. Depressing the ENTer key for a period of two seconds displays the bank list, as well as the frequency just entered. From here you select a bank from the 'A to J' upper case list or 'a to j' lower case list. After selection, ENTer commits the frequency and mode to that memory channel. The AR-8000 then asks you to enter a seven letter alphanumeric name applicable to the frequency selected. For example, if you select 76.670 MHz, which is NSW Ambulance channel 1, a typical message maybe AMBO 1. Letters and numbers are selected by rotating the dial switch located on the top panel.

If you were fortunate enough to have a thousand frequencies to program into the radio, then it would take considerably longer than the usual scanning fare to program. However, once entered, the frequency data, mode, attenuator status, text and channel number are permanent — at least until you write over them or delete them from the memory. Instead of the common volatile memory back-up system, the AR-8000 utilises an EEPROM. The **E**lectronic **E**rasable **P**rogram **R**ead-**O**nly **M**emory releases the need for additional batteries or slow discharge capacitors.

Variable defaults

As with the SCAN banks, the SEARCH banks are programmed with default parameters that are of little relevance to local conditions. As with all of the top-shelf AORs the defaults can be re-programmed to suit your wants and desires. As previously mentioned, the memories are designated by upper case or lower case letters. Those banks carrying the lower case letters can be protected by a password.

The user can enter a four letter (or digit) password which only he or she knows, thereby keeping prying eyes out of their valuable frequency data. Another feature applicable to the lower case banks is handy if you do a lot of searching, especially in low-traffic areas.

Lower case 'j' can be toggled to store all active frequencies detected during search. Imagine not having to spend hours in front of a scanner at times when not a lot is happening. With this feature, you're able to set the thing running and return later to see what the AR-8000 has found.

Stepping through the bands

When the search parameters are being set, the step size required can be selected from any of the following pre-programmed increments: 50, 100, 200 and 500 Hz, 1, 2, 5, 6.25, 9, 10, 12.5, 20, 25, 30, 50, 100, 200, 250 and 500 kHz. If none of those take your fancy, you may select any multiple of 50 Hz up to and including 999.995 kHz, or steps of nearly 1 megahertz!

Some of the characteristics found on the AOR are just the same as those found on lesser receivers. You can lock frequencies out of the scan sequence and even out of the search mode.

As well as locking individual channels out, scan banks can be edited to suit your listening habits. Any channel can be nominated as 'priority', another thing found on even the lowest-price scanner.

But what the AR-8000 has that the others don't is a Band scope. The Band scope equips the scanner user with a powerful monitoring tool, as it displays a bar graph on the third line of the four-line LCD display. It indicates activity on five channels either side of the center frequency, which is the one displayed in the VFO. This gives you the ability to 'listen in' on a chunk of RF spectrum rather than just a single channel.

PC control

Computer control of scanners is not new. Bearcat tried it about 25 years ago, with moderate success. Top shelf receivers, such as those made by Icom

continued over page ....☞

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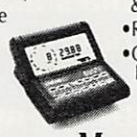

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AOR AR-8000

"It does it all..."

(Continued from page 39)

and Yaesu, as well as AOR's own AR-3000, also have computer interfaces. But this is probably the first time we have encountered a hand-held scanner with the software and hardware available as an optional extra to enable PC control. Okay, we've described just a few of the dozen or so special functions and tricks the AR-8000 supports. All of these attributes are fine, but how does it perform? By accident, I discovered that the AR-8000 handles AM signals exceptionally well. AOR has built a ferrite bar rod aerial into the receiver, thereby vastly improving reception of medium-wave signals. Even with the semi-flexible rubber duckie removed altogether, the AM radio stations still romp in! Switching to SSB and connecting a fairly short wire antenna proved that this is the way of the future: all-in-one units which cover many bands and modes. On 8867 kHz USB I could clearly copy aircraft many thousands of kilometres offshore.

When tuning in SSB the supplied aerial is not intended to be used. Interestingly enough, it is with SSB that I can find only one fault, albeit a subjective one. The audio seems a little harsh, but maybe that's because I am used to the softer and more subtle sound of FM.

Acceptable audio

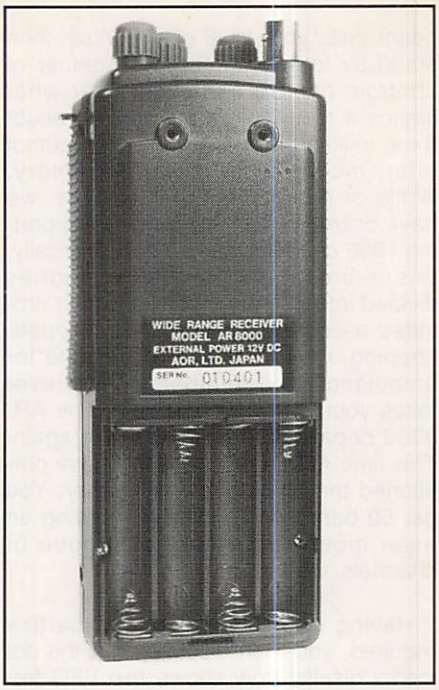
As for tuning in FM broadcasters and TV carriers in WFM, the AR-8000 gave a good account of itself. The reproduced audio was clean and crisp and, while not exactly HiFi stereo quality, it was easy to listen to. But scanning is what the AOR was built to do, and that is what it does best at a ripping 30 channels per second.

Overall, a very pleasing result...

Getting down to the cold hard facts and figures, the AR-8000 comes standard with four 700 mAh 1.2V AA-size NiCd cells. (When finally exhausted, they're a heck of a lot cheaper to replace than a dedicated pack.) When fully charged, an average of five to seven hours continuous scanning is possible. And if you're simply sitting on a single channel, and not using the built-in light (which, by the way, back-lights the keyboard), eight or more hours service is possible.

SNAR (Sensitive New Age Radio)

Sensitivity across the board is excellent. For frequencies between 500 kHz (it's actually programmable down to 100 kHz) and 2 MHz sensitivity is not quoted



but, given my experience mentioned earlier, it seems acceptable. From 2 MHz to 30 MHz SSB is 0.25µV, AM 3µV and NFM 1.5µV. That's very acceptable, even when compared to dedicated HF communications receivers.

From 30 MHz to a heady 1.0 GHz, the AOR comes into its own. SSB and AM 1µV, narrow FM 0.35µV, and finally wide FM 1µV. Above 1,000 MHz or 1 GHz, sensitivity varies from 1µV to 3µV depending on mode.

As a buyer, apart from the receiver, you get a power supply, four NiCds as mentioned, DC auto cigarette lighter lead, a 16 cm wide-band semi-flexible aerial, belt clip, hand strap and operating manual.

Read, then read again...

The manual qualifies for comment. It is 115 pages long. Not only does it cover everything you could possible want to know about the radio, but it also covers topics such as external antennas, and the best types to use to extract the most from the receiver.

Other topics that receive attention are coaxial cables, filters, propagation effects and, finally, further reading material. While some fractured English (Jinglish) is evident, overall the quality of the handbook is superior to that normally supplied with similar units.

If I could summarise the AR-8000 is a few words, I would have to say it far exceeded my expectations. I could find little to fault in the unit, its frequency range, value-added features and sheer user-friendly layout make it a 'must have' for any serious radio monitor, be they HF, SWL or scannist.

Bandspread

By Greg Towells

Welcome again to the column where anything radio can turn up... and quite often does. I invite contributions from readers on any interesting subject, or suggestions on what you might like to hear about. You can find my postal address on the first page of this magazine.

COUNTRY UHF CB

Some weeks ago I toured the southern and south-west areas of NSW, suitably equipped with all manner of radio gear, frequency listings and whatever else I could think of to cover as much spectrum as possible while on the move.

Virtually everywhere I travelled from Sydney on the Hume Highway through to where I turned off onto the Sturt Highway towards Wagga and onwards to Narrandera, I found I was in the coverage area of at least one UHF CB repeater. This was certainly a comforting feeling while travelling long distance knowing that, if I found myself in difficulty, the repeater network would enable my signal to cover a vast area if assistance was needed.

Naturally, there was a slight drawback — outside of the bigger town repeaters there was very few responses to our general CQ calls and most conversations we had was with other travellers passing through the area.

I recommend to *anyone* travelling to have UHF CB on board, and also a copy of CBA with the repeater listing to consult for the local repeaters. Having that listing at hand permitted us to plan approximately when to switch to the next major repeater channel as we progressed along the highway.

A problem all too common to UHF CB city dwellers became evident as we hit the repeaters in larger towns. Yes, you travel 500 kilometres to get away from it all, only to be blessed by the strains of the latest hit list, music boxes and usual foul language on the main country UHF CB repeaters! After reasonably sane sessions from Goulburn to Gundagai, we found one Wagga repeater to be just as bad as the lot we'd left behind in Sydney. Maybe they pipe the garbage through to that repeater just like in a national network. Bit of a shame...

I have good news to report about UHF CB and its uses out in the bush. From about Yass onwards I noticed signs and notices along the road and the approaches to towns stating a phone number to ring, or a UHF CB channel to use to report fires. What a great use of CB and a way to instantly involve hundreds of extra people in the lookout for the first signs of bushfires in remote areas!

Many devastating fires start as isolated outbreaks well away from anywhere but, if they're contained quickly, most can be prevented from posing a threat to property or lives. I noted that channel 6 simplex was advised for fire reporting south from Yass, and channel 8 duplex in the Wagga/Narrandera area of southern NSW. I also noted that a number of smaller towns had posted signs on their approaches advising of which UHF CB channel to use to contact various businesses in the area, such as the local car breakdown assistance services, supplies, fuel and on to police and emergency services.

Some towns we passed through seemed to be alive on UHF CB, making it very easy for locals and travellers to contact the business of their choice via the medium of radio. This reminds me of the situation in the USA, where all manner of public services were accessible via 27 MHz CB many years ago.

I would like to compile some sort of a listing of what services and businesses are using UHF CB for public contact in country areas of Australia, as it is impractical for me to traverse around to find out. This sort of thing would be a useful addition to the UHF CB Repeater Listing for travellers. So if you have information about what services or businesses use UHF CB for these purposes and advertise it in your area, why don't you let me know.

PRO-37 TAPE RECORDING INFO

Further to my recent piece on adding tape recording jacks to hand-held scanners comes a interesting bit from Jason Blowers. He writes to say that when he carried out the mod on his PRO-37, it proved unsuccessful when the power save mode was activated. Seems that the recording sounds like the radio is unsquelched every few seconds until the power save mode is deactivated.

Jason's solution to this was simple, did not involve any dismantling of the radio and required only minimal soldering. This is it: find an old pair of Walkman headphones lying around the place, snip of the speaker parts and strip the ends of the wires.

Solder a 150k ohm resister to the end of the positive wire of the headphone lead and solder the other end of the resister to the center of a female RCA plug. Solder the remaining wire to the outer shell or ground lug on the RCA plug. With this completed, just connect the plug to a stereo input, perhaps the CD in or aux type input. You might need to experiment with the value of the resistor, or delete it entirely until you eliminate the background hum or hiss.

Once done, you will be surprised at the excellent sound quality and the recordings will be of a high standard. Thanks Jason for that tip.

EXTENDED COVERAGE FOR PRO-43

Lots of interesting signals exist in the 30 to 50 MHz area, such as various drive-in fast food establishments, cordless phones (which you shouldn't listen to if there is phone traffic on them), remote mics, baby monitors... the list goes on and on. Until now, if you wanted to monitor that area of spectrum you needed an expensive super-wide continuous coverage scanner.

However, here are some mods to more common scanners that will enable coverage of the 30 to 50 MHz area. Bear in mind that the sensitivity of your radio may or may not be magnificent there, but most signals of interest would probably be fairly local anyhow.

A warning before we go on: these mods are only for those competent with intricate work on delicate circuitry. If you are unsure, don't do it.

Remove the battery, antenna and back cover. Remove the six screws holding the circuit board in place. De-solder the two antenna connections from the board, and bend the antenna ground tab completely away from the board. Carefully lift the board and unplug the connector, then place the board to one side.

Remove the two screws from the next board and remove it as well, then unplug the white connector at the bottom of the board. Lift that board and lay it aside. De-solder and remove the shielding from the final board, revealing the CPU. Note diodes D1 to D5. Remove the diode from D3 location.

This will give you the 30 to 50 MHz coverage. The drawback is the loss of the 66 to 88 MHz band.

See you next time.

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GETTING BETTER PERFORMANCE FROM *ANY* SCANNER

Jason Reilly reveals a few simple tricks which let you get more from your monitoring!

Scanning is a fairly unique hobby but, like other hobbies, there is always the individual need to do better, to get more out of the hobby. Scanning is no exception.

If there was a way which you could get more performance out of your scanner, and out of the hobby in general, would you be interested? Yes? Then read on — you'll add more to your monitoring enjoyment by following these simple suggestions.

Batteries

You know the feeling. You're listening to some interesting event on your hand-held scanner, when the 'lo-batt' indicator tells you that your listening pleasure is about to be rudely interrupted by your batteries going flat.

Nickel-cadmium (NiCd) are the most popular batteries for hand-held scanners. Unfortunately, NiCds need to be used in a particular fashion to get the most out of them. You're not using NiCds? Go out and buy some as soon as you can. They offer the most economical way to power your hand-held scanner (and, for that matter, *anything* which uses batteries and gets regular use). NiCds can be recharged many, many times before giving up the ghost.

Good quality AA or 'penlite' size NiCds, which are the type most commonly used by portable scanners, have capacities of around 600-750 mAh (milli-Amp/hour, a measurement of their supply rating). As an example, you can buy four good quality AA NiCds from Dick Smith Electronics for around $22. If these last for 400 charges, for instance, then the cost per charge is five and a half cents, plus the cost of electricity to charge them (although you could always take them to work and let the boss pay!).

Compare this to normal AA cells, which have a capacity of 1200 mAh (equivalent to two chargings); or alkaline AA cells, with a capacity of 3600 mAh (or six chargings), at a cost of $3.40 and $8 respectively. This works out to be $1.70 for the normal AA cells, or $1.33 for the alkaline AA cells: a convincing win to the NiCds.

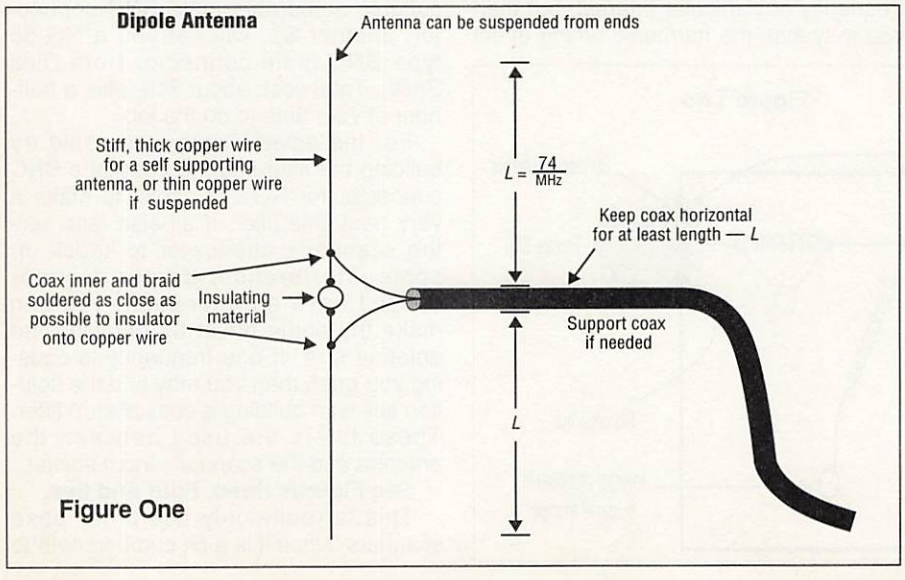
When first buying NiCds, it is recommended that they be fully charged (around 14 hours for most chargers) and fully discharged for three times to prepare them for the busy life they will lead. During use, NiCds may develop a 'memory effect'.

This is when the batteries get only partially discharged throughout the day, and placed on charge overnight. After a while, the batteries will appear to be flat at the time they are normally placed back onto charge, when they should in fact be able to keep on going for significantly longer.

To avoid this from happening in the first place, once every three to five times the scanner is used, leave the scanner switched on to fully discharge the batteries, then fully charge them. To rid the batteries of the memory-effect, you can charge fully, and then discharge them fully, three times to 'break' the cycle. A friend of mine momentarily applies 12 volts to each cell for really stubborn cases. I wouldn't recommend this for the faint-hearted, however. The idea behind this is to 'burn through' the 'dendrils' that build up inside them, best done using a very short application of a higher voltage than normally used for charging.

If NiCds still don't offer enough life, then you can tackle the problem in several ways. Scanners such as the Icom IC-R1 can have an additional battery pack added on, and using this, up to 12 hours continuous scanning can be a reality. Some Uniden Bearcat scanners have detachable battery packs. The more resourceful people can rebuild the standard pack with higher capacity NiCds.

Spare, pre-charged packs can also be carried for times when you need to lengthen the time spent scanning away from a suitable charging source. **Nickel-hydride** batteries, while being more expensive than NiCds cells, offer double the capacity and so double the time between chargings.


Dipole Antenna
Antenna can be suspended from ends
Stiff, thick copper wire for a self supporting antenna, or thin copper wire if suspended
L = 74 / MHz
Keep coax horizontal for at least length — L
Coax inner and braid soldered as close as possible to insulator onto copper wire
Insulating material
Support coax if needed
L
Figure One

Technique

To get the most out of scanning, a few clues as to how to monitor the services in which you're interested can mean the difference between hearing nothing, and being able to get the full picture.

Trunking, for example, requires special techniques. For the 800 MHz trunking system — between 865 and 870 MHz to be exact — each channel in a particular voting group is separated by exactly 1MHz. So if you hear some activity on 865.550, then the other channels available to this user (and any other user sharing this same local 'group' of channels) are ....☞

GETTING BETTER PERFORMANCE FROM *ANY* SCANNER

(Continued from previous page...)

866.550, 867.550, 868.550 and 869.550 MHz.

Newer trunking allocations are more complex than this. The latest systems for trunking are: 165.19375 to 168.19375 output and 169.79375 to 172.79375 input (that is, a 4.6 MHz offset); and 415.5625 to 418.075 output, with 406.1125 to 408.625 input (9.45 MHz offset).

Some services use 'split simplex' operations. This is where the base transmits on one frequency, and the mobiles transmit on a different frequency. Taxis often use this type of operation, as does Telecom's newly-commissioned Tasmanian radio network.

To effectively monitor these type of operations, program just two channels (the base frequency and the mobile frequency) into one bank, select no delay, and scan just those two frequencies. This won't work very well on scanners which don't allow you to select no delay (AOR and Yupiteru models are two that come to mind).

Antennas

The helical-wound whip that is supplied with most scanners is very much a compromise. Replacing this with a telescoping whip is a good idea. If your interests, scanning-wise, include listening to the VHF mid-band (70-85MHz), try to get a telescopic whip that is around 100cm long.

Fully extended, this will act like a quarter-wave antenna, and while the theory says that this antenna needs a ground plane to work properly, I've found that the scanner itself provides a ground plane of sorts. You may find that this ground plane effect is improved when you have the charger plugged into the scanner, or hold the scanner at arm's length. If you want, you could even sit the scanner on a sheet of aluminium foil, shaped to the correct dimensions, to act as a ground plane, but this isn't very practical.

If you like to scan a mix of frequencies, have the antenna extended out as far as needed to form a quarter wave antenna at the lowest frequency. Having a telescoping whip extended too long for VHF/UHF doesn't seriously degrade performance, but having it too short for VHF does have a noticeable effect. If you scan mainly the UHF frequencies, a UHF CB quarter or half-wave antenna would be fine. For the air band or high-band VHF, any of the amateur two metre (144-148MHz) antennas would do nicely. Perfectionists could have an antenna custom-made to the band you most prefer.

There comes a time when an indoor scanner antenna just isn't enough. If you're thinking of an external antenna, but just don't have the money, then do I have a great antenna for you! This design was passed on to me by a friend who is still using the same design 10 years later. I have used this antenna to copy VHF mid-band transmissions over 150 km away. It's performance drops off a bit at UHF, but it still isn't too bad. The antenna forms a center-fed half wave dipole at the VHF mid-band and, by virtue of harmonics, works well for the VHF high-band, *and* at UHF — and it's oh so cheap!

See Figure One.

Aside from the cost of the coax, just a few scraps of plastic and $2 of wire sees the antenna built and in action.

Of course, it can be trimmed to suit a frequency of particular interest, but then you may lose the harmonic tuning effect on higher bands. This antenna is ideal to hang inside your roof-space, providing the roof isn't made of metal. Just remember to keep the coax coming from the joint horizontal for a quarter wavelength, and keep the whole thing away from anything metallic.

Interference

There are several ways to reduce interference on scanners. Firstly, if the scanner is being used with its own antenna, one of the easiest ways to reduce interference is to shift the scanner around, re-orientate the antenna to minimise the interference, and to maximise the received signal. At UHF especially, just a small move can mean the difference between a reasonable signal and no signal at all. If you need to move the scanner to such a position that it is out of the way where you can't hear it very well, add an extension speaker. This not only makes it easier to hear the resultant audio, it also improves the quality of the audio as well. This applies doubly to hand-held scanners.

If you're using the external antenna described above, you can mount the antenna horizontally, and have the ends pointing to the source of the interference, to 'null' it out. Doing this will degrade signals a bit, but it is better than being interfered with all the time. If FM broadcast interference is the culprit, you can create a filter that may help. Tandy sells a TV accessory called an 'FM Trap' (catalogue no 15-577).

See Figure Two.

With the addition of some suitable connectors, BNC being the best because of size and loss characteristics, a very effective filter can be built, and will attenuate the wanted bands very little. A visit to Tandy with $9.95 will buy the filter and a panel-mount BNC female connector. Since Tandy doesn't have a suitable solderable male BNC connector, another $3 will get you a RG-58 type BNC male connector from Dick Smith. Total cost: about $13, plus a half-hour of your time to do the job.

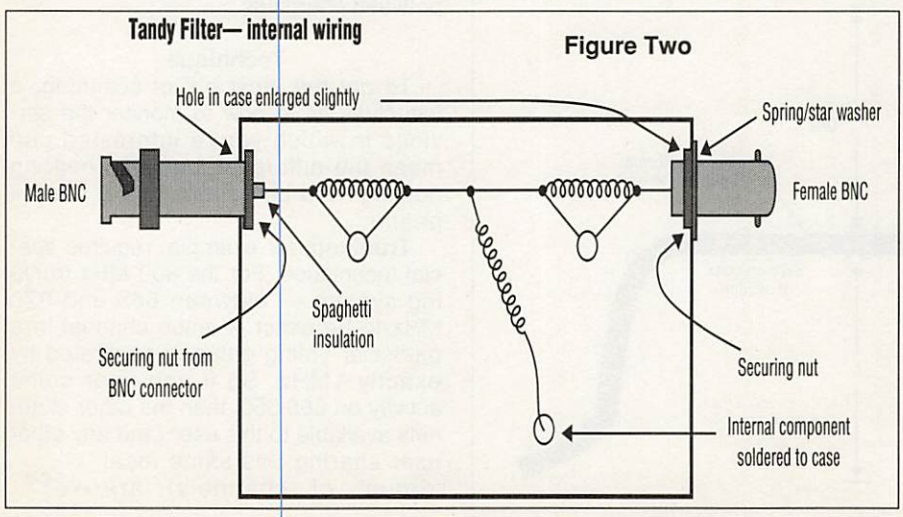
For the adventurous, you could try building the filter into the body of a BNC connector for RG-213 cable, to make a very neat little filter. If all else fails, use the scanner's attenuator to knock off some interference. If your scanner doesn't have an attenuator, you can make the same effect by reducing the antenna size. If one frequency is causing you grief, than you may find the solution lies with building a coaxial stub filter. These filters are used between the antenna and the scanner's input socket.

See Figures three, Four and five.

This is really only useful for base scanners, since it is a bit cumbersome to

Tandy Filter— internal wiring

Figure Two



use in a portable situation. To make the filter, make a T-join in the coax, with the 'upright' section of the T cut to the appropriate length. To work out this length, divide 4950 by the interfering signal's frequency in megahertz. The answer will be in centimetres, and this is the length to cut the 'T'.

A more effective filter can be made by adding another 'stub' of the same length as the first 'stub', with the distance between the two T-joins that of the length of a 'stub'. This will work for RG-58 and RG-213 cables.

Also, be aware that this filter will also attenuate odd harmonics of the chosen frequency (ie. if you choose to filter out 148 MHz, it will also filter out 444 MHz, 740 MHz, and so on). As an example, if you wanted to filter out some pager interference on 148.0125 MHz, you would perform the following calculation: 4950 divided by 148.0125 MHz = 33.443 cm).

For our purposes, 33.4 cm is close enough. A more sophisticated way to trim the coax to length would be to have a scanner with a signal-strength meter, and attach a filter with the coax 'T' purposely 5 cm too long. Trim 2 mm at a time off the T until the interfering signal reaches a minimum on the signal-strength meter. The finished filter can now have the joins taped up, and can be rolled up and taped or cable-tied to make a neat unit.

A few general tips

When using RG-213 cable for a base scanner installation, install an RG-58 'tail' to help take the stress off the scanner's connector. Make sure the RG-213 is secured, so that no weight is being carried by the scanner's connector. If you are worried about loss, don't be, the short length of the RG-58 (10cm is all that is needed) will have very little loss.

If you are still worried, get some 'cell-foil' type coax. This stuff is about as thin as RG-58, about as flexible, yet has the loss of RG-213.

It is sometimes used by cellular phone installers, so scrounge around there for some short scraps. Keep scanners away from electrical noise makers, such as: digital cellular telephones, televisions, CD players, those new compact fluorescent globes, and computers. The interference potential from these is very high.

When using a scanner while portable, and you wish to be discrete, use a pair of really cheap in-ear earphones.

The audio response is such that high and low frequency (audio-wise) noise and hiss isn't a problem. In other words, the cheap earphones are good for voice-audio but not much good for hi-fi — and that's just what we want!

These are also good for when using the scanner in high noise environments, or when you're tucked up in bed and you don't want to disturb anyone (especially the person next to you!). But don't fall asleep with them still in your ears, it's mighty uncomfortable!

Try to take the scanner with you whenever possible. You may never know when you may want to use it. And most important of all: keep CB Action handy, to make sure you're up-to-date with the latest happenings in scanner-land!

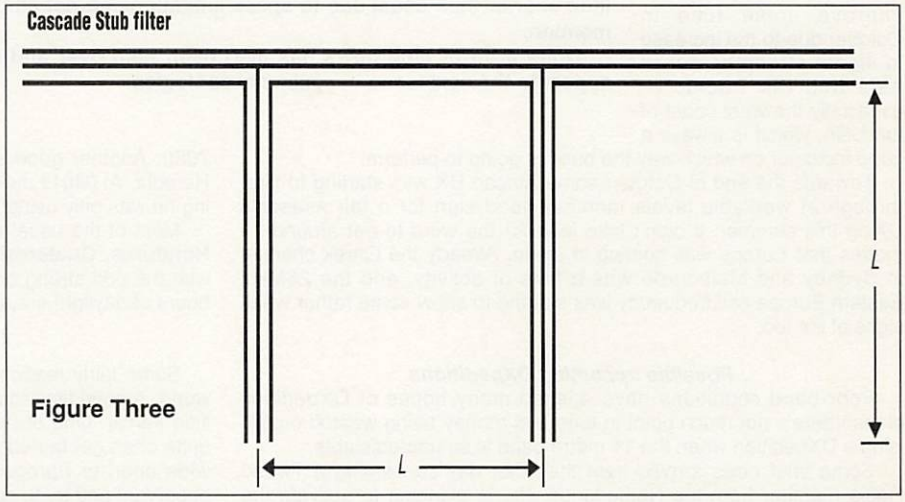
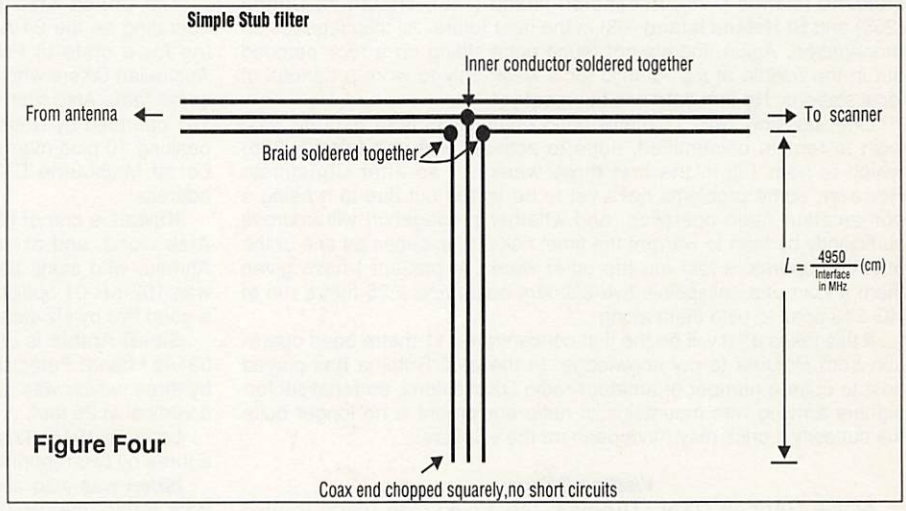


Figure Three


Simple Stub filter
Inner conductor soldered together
From antenna
To scanner
Braid soldered together
L = 4950 / Interface in MHz (cm)
Coax end chopped squarely,no short circuits
Figure Four

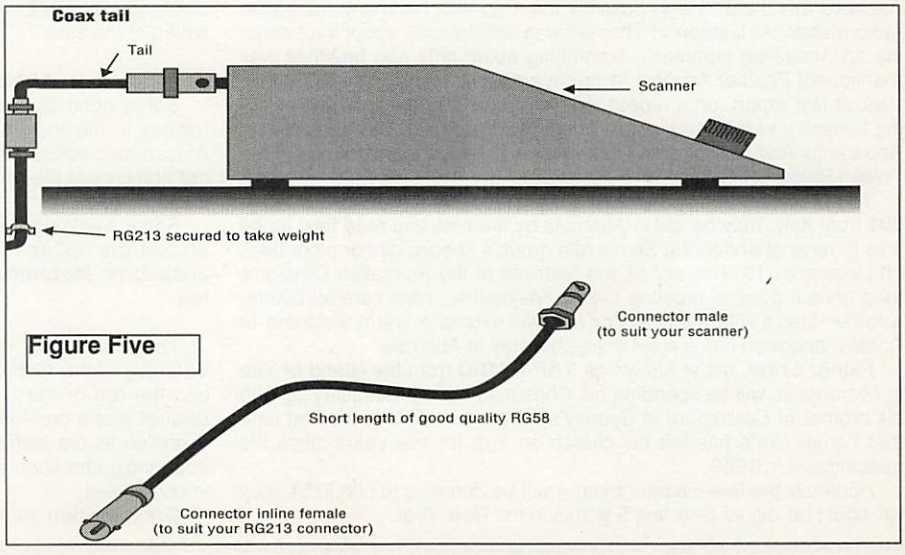


Figure Five

By Jack Haden

DXinternational

11 metres has been quite active DX-wise since mid October onwards, with good workable signals to match! This issue's column, however, is a little shorter than usual due to space limitations so not all the DX gets a mention.

Quite a bit of club news has also been held over and will possibly appear in the next issue — again, my apologies.

I, along with many other experienced DXers, knew the band was about to improve some time in October due to the increase in signal strengths out of Asia and the Pacific — especially the west coast of the USA, which is always a good indicator on which way the band is going to perform.

Towards the end of October some African DX was starting to filter through at workable levels, another good sign for a fair season's DXing this summer. It didn't take long for the word to get around 11 metres that Europe was coming in again. Already the Greek channel in Sydney and Melbourne was a hive of activity, and the 26MHz Eastern Europe call frequency was starting to show some rather weak signs of life too.

Possible upcoming DXpeditions

Poor band conditions have dashed many hopes of DXpedition plans; there's not much point in time and money being wasted organising a DXpedition when the 11 metre band is so unpredictable.

Some brief news arrived here the other day concerning a Tweed Radio member from the Netherlands who is planning to activate the **Falkland Islands** (198), **Ascension Island** (148), **Tristan de Cunha** (258) and **St Helena Island** (63) in the near future. All this depends on propagation. Again, there's not much point sitting on a rock perched out in the middle of the Atlantic for a week only to work a handful of local stations. No firm date has been set yet.

One, possibly two, 11 metre band enthusiasts from Sydney, who wish to remain unidentified, hope to activate **Rotuma Island** (325) which is near Fiji in the first three weeks or so after Christmas. However, some problems have yet to be sorted out due to it being a non-amateur radio operation, and whether propagation will improve sufficiently by then to warrant the time, risk and expense as one of the potential operators told me the other week. At present I have given them a loan of a collapsible five-element beam and a 25 metre run of RG-213 coax to help them along.

If this takes off it will be the first concentrated 11 metre band operation from Rotuma to my knowledge. In the past Rotuma has played host to quite a number of amateur radio DXpeditions, so fanatical foreigners arriving with mountains of radio equipment is no longer quite the curiosity it once may have been for the villagers.

Visiting DXers...

Active German DXer, **Thomas**, the **13-AT-285** plans to visit Australia this January and possibly meet up with his many Australian radio friends. At last report Thomas was enthusiastic about experiencing an Australian summer... something about girls and beaches was mentioned! Popular Arizona 11 metre enthusiast **Andy**, the **2-TR-249**, was, at last report, on a repeat visit to Australia and was again enjoying himself and the usual warm Australian hospitality that goes with it. Apparently Andy is being well taken care of by his many friends in the Tweed Radio DX Group.

The president of the Sierra Alfa DX Group, Mr **Antonio**, the **1-SA-001** from Italy, may be still in Australia by the time you read this, as he was to have attended the Sierra Alfa group's special dinner night back on December 10. This will be the highlight of the Australian Division's third annual general meeting held in Melbourne. I am sure all DXers, whether Sierra Alfa members or not, will extend a warm welcome to Antonio and wish him a most enjoyable stay in Australia.

Father Chris, better known as **YAP-RADIO** from the island of Yap in Micronesia, will be spending his Christmas in Australia, staying with his brother at Carlingford in Sydney's north west. This is the first time that Father Chris has left his church on Yap for five years since his appointment in 1989.

Hopefully the five-element beam I will be donating to him in Sydney will boost his signal by a few S-points in the New Year.

Central/South America and the Caribbean

Costa Rica has been coming through quite well with the appearance of Mario, signing as the 69-MCH from Cartago. At 0345z Mario was a good five by seven. QSL cards go via PO Box 391, Cartago, Costa Rica 7050. Another good signal was CR-290 with Julio at the helm from Heredia. At 0401z Julio was five by six — quite a good effort considering he was only using five watts output into a three-element beam.

Most of the usual signals out of **Panama**, **Ecuador**, **El Salvador**, **Honduras**, **Guatemala** and **Mexico** have usually been regular along with the odd strong one from South America and the Caribbean. The hours of daylight are a good hunting time for this region.

Middle East and Arabia

Some fairly reasonable openings have occurred to this part of the world. A good time to check is around the 0600z mark — sometimes a little earlier. One of the main problems with this region is that signals quite often get buried amongst the European crud should the band be wide open to Europe at the same time. It's is just a case of being observant and try to sort out who is who, so to speak.

The **United Arab Emirates** was noted at 0944z by way of Amal, operating as the 94-AA-01 from Dubai, and although Amal was looking for a mate in France he seemed happy to work a couple of Australian DXers who called him. At the time Amal was five by six with some fade. Also from Dubai with a very strong signal was the 94-AT-101 operated by Nasser. At the 1000z mark Nasser was five by eight peaking 10 plus over nine at times and was being pursued by a number of Melbourne DXers at the time. QSL Nasser via his callbook address.

Kuwait is one of the more regular countries on 11 metres from the Arab world, and at 1001z I heard a good five by eight signal from Ahmed, who signs as the 102-VR-012 from Kuwait City. Also noted was 102-KR-01 operated by Abdullah from Surraah and at 0855z was a good five by six steady.

Saudi Arabia is usually about the band from time to time, and at 0919z I heard Peter, the AIS-01 operating from Mecca. Peter was five by three, which was good considering he was only using 15 watts into a vertical at 25 feet.

Later, at 1014z I could just hear 48-FM-??, operator unknown, with a three by two report at the very best.

Israel was also about the band, with a very strong signal coming from Rabin, the JR-106, from Tel Aviv. At 1046z and despite being clobbered by the Europeans, Rabin was a good five by six peaking seven at the time.

Africa and the Indian Ocean Region

Some good signals have started to filter through from the island nations in the Indian Ocean and from some of the countries on the African east coast. As usual, the gang in Western Australia seems to get first pick at the offerings before the band really opens here on the eastern coast.

Some weak signals from the east coast of Africa have been noted around the 0530z mark onwards, noted: **South Africa**, **Namibia**, **Zimbabwe**, **Mozambique**, **Uganda**, **Somalia** and **Eritrea**, to name a few.

Europe

The band really opened in a *big* way to continental Europe on Saturday night, October 29. For nearly two hours signals were well into the red of the S-meter, some of them so strong that adjacent splatter was a problem from time to time! A lot of old friendships were rekindled as old mates found each other again on the 'usual' meeting frequency, and such was the excitement one could hardly get a word in either way!

Great Britain was about in abundance and, at times, with huge

signals too. It was encouraging to hear a Melbourne station, Allen the 43-AR-145, make his first contacts into the United Kingdom. Allen was well rewarded with contacts to 26-AT-258 Graham and 26-AT-213 amongst others, with all signals here around the nine mark at 1055z. Good luck Allen and hope you work some more new countries in the future.

A big signal out of Manchester belonged to the TFC-429, and at 1033z he was five by nine plus, not long after I heard Chris, the TFC-427 at 1100z working Brian in Western Australia. Chris was five by eight here.

Belgium was back with a vengeance too, with big signals coming from Adrian, the 16-AT-205 at 1005z, when Adrian was five by nine plus. Marc the 16-AT-293 was also about, and at the earlier time slot of 0840z was a good readable five by six but was troubled with fading.

Germany was about with a variety of callsigns to keep us entertained, with the best signal for the evening belonging to Dieter, the 13-AT-107. At 0940z Dieter was only a five by three, but much later at 1100z he was five by nine steady. Helmut, the 13-HDX-12 from Bremen, was five by nine plus 20dB at 1115z and was working a mate in Sydney in the German language. Meanwhile, Thomas, the 13-AT-285 was announcing plans to visit Australia around January 1995. I'm sure all his Australian DX friends will make him feel welcome when he arrives.

Poland was well represented on the band by the appearance of 161-AT-114, although he was only five by one at 0759z as the band was just opening to Europe. Joe, the 43-AT-397 in Australia was having a battle working the 161-WE-44 at 0617z, with the Polish station a poor three by three at the most. Joe gave it away in the end...

Further up the band was 161-AT-290 with a fair five by five report working a mate in Melbourne at 0625z. Polish stations are now quite often the first Europeans to appear when the band opens to the continent.

Malta was noted around the band at 1102z by way of MA-102 operated by Giano, and was a fair five by five report at the time. I also noted 93-AT-10? at 1133z, but due to a strong station from the island of Sicily interfering I lost him in the noise.

Czech Republic was loud at clear at 1022z, with a good five by nine plus signal coming from Rovik, who was signing as the 329-CZ-202. Using just 20 watts into a home-brew quad at 60 feet, Rovik had quite a pile-up of Australian stations calling him at the time.

Russia was about as usual, and a good signal came to us from the 50-AT-121, who at 0831z was a reasonable five by seven report with some fade.

Also noted was Vlad, the 50-RP-08 from Moscow, who at 0911z was five by six peaking nine. However, be cautious with this one, as he is asking two American dollars to ensure a card back from him. Best to give him a miss, I think, and save your money for something more rare...

The **Ukraine** is always about when Europe appears, and at 1128z I logged the 315-CM-23 with a huge five by nine plus signal. He had a fairly big pile-up of Australian stations at the time, attracted by the big signal, no doubt!

Moldavia is one of the harder ones to confirm out of the former USSR, and I was pleased to hear 312-ER-7, name unknown, on air around 0600z on November 7 operating in a DXpedition capacity. At the time he was issuing progressive number 450 and, not long after, despite a poor four by three signal, some Australian stations made it through for a contact. However, quite a few missed out, too, as his signals started to fade quickly. I missed the QSL route which was via an address in Lithuania.

The **Slovak Republic** is still needed by a few DXers, and it was nice to hear Roba, the 329-CZ-69, signing as portable 330 prefix in Slovakia. At 0800z Roba, who was also running only 20 watts into a small three-element home-made beam, was five by four peaking six. Noise from other stronger Europeans prevented me from getting the QSL route via an address in Prague, in the Czech Republic. Roba requests one American dollar or two IRCs for your QSL expenses thus ensuring a return card.

Asia and the Pacific Region

It was a pleasant surprise to hear **New Zealand** coming in again after such a long absence due to the poor propagation we have had in past months. Sunday afternoon on November 6 the band literally burst wide open to New Zealand and the Pacific in general, with huge five by nine plus signals scattered all over 26 and 27MHz.

The New Zealand SSB call channel was bedlam, and resembled George Street in Sydney at the height of the PM peak period.

Confusion reigned supreme as many found old mates on the call channel, only to lose them amongst the babble and burble of muddled voices with the odd linear working overtime.

Even the occasional kiwi temper flared as Australian stations were told to "go back to 27MHz where you belong!". The pot calling the proverbial kettle black, so to speak?

I heard many New Zealand stations on our channels 16 and 35 enjoying themselves, not to mention the others from the land of the long white cloud found using some 27MHz high channel 'no-no' DX call frequencies. Come on fellows, what's good for the goose is good for the gander!

New Zealand, as I mentioned in the introduction, is back with us again after a long absence.

A good signal came at 0245z from Mac in the Bay of Plenty, who signs as the AR-400. Mac was five by nine plus 20 dB with just an old Cobra barefoot into a mobile antenna.

Graeme and Judy, 41-AT-122 and 41-AT-195 respectively, were very loud here at 0210z, and appeared to enjoy themselves working Asian and Australian stations. Also very strong was the Kay-One-Zed-One (K1Z1) from kiwi country who, at 0245z, was well into the red on my meter with little fade at all.

Conditions held for just over four hours across the Tasman with fade knocking them out one by one around 0545z onwards as the DX path changed.

The Philippines was coming through quite well by way of Raymond, the 79-SA-005, and at 0310z he was a good five by six report. A little later at 0650z the band was still open to the Philippines with Bong, the 79-AT-101 coming in at a steady five by eight peaking nine.

Hong Kong was noted on the band at 0400z by way of Tommy, the VS-1997 out of Repulse Bay. Tommy was a good five by five peaking seven report, but couldn't stick around due to a telephone call for him at the time.

Rumor surrounds the actual location of Bob, the RB-2. Some say Bob has told them he is in Hong Kong, whilst he tells others he is1,000 kilometres north of the Philippines and will not elaborate much more on his location! Bob has been about the band for some time now, although mystery surrounds his actual location...

South Korea was loud and clear with the five by eight signal coming from RJK-10 operated by Mr Soni, located near Seoul, the capital. At 0319z Soni was clobbering the noise from Indonesia and was heard speaking to a station in Melbourne giving his rather long and confusing QSL address.

New Caledonia was also back with a vengeance, with strong signals coming from many of the old regulars including Jack, the 172-AT-105 who at 0400z was a whopping five by nine plus, and was very busy catching up on all the gossip with his DX friends.

Okinawa, part of the **Ryuku Islands** off southern Japan, was logged at 0331z with the appearance of JS-601 with Atsu at the microphone. At the time Atsu was a good five by six report from the regional capital Naha. Also from Japan, and heard around the same time, was 25-SE-03 operated by Jun from Nagasaki in southern Japan. Jun was five by seven with heavy fade at the time.

Vanuatu is always about the band at one time or another by way of regular, Jerry, the 197-AT-101. At 0310z Jerry was a fair five by five report and mentioned he was having a spot of mail trouble, both in and out of the country. So just be patient if you are waiting for a card and hope for the best. We all know the mail system becomes bogged down around the Christmas holiday period and thus can expect delays as usual.

TIME PLUS IS ONE OF THE CB STAYERS...

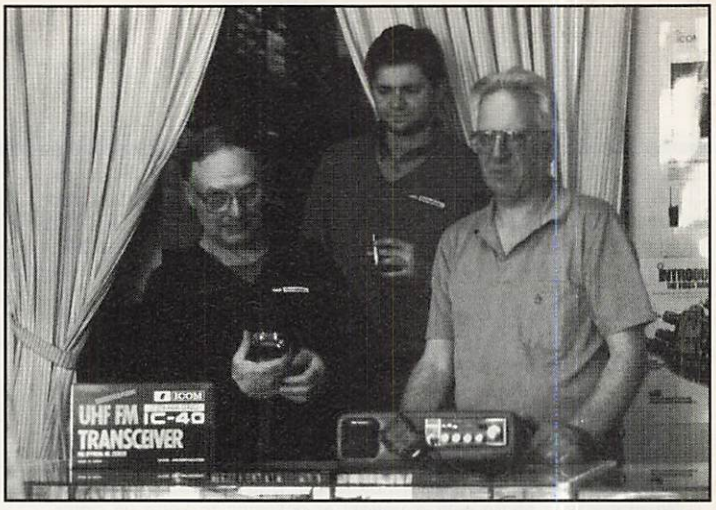
Time Plus is one of our longest-running-advertisers having been around now for just over 20 years.

Although the company has changed premises three times during this period, it has always remained in Sydney Road, Brunswick and continues to trade there at number 55 Sydney Road.

The staff are regularly questioned about the "Time Plus" name and it came about from the fact when the company started it specialised in digital watches and calculators, hence the "time" and "plus".

They moved into CB radios in the days of Johnson Vikings, Kracos, Xtals, Courier Spartans and the rest and, while these names have all vanished, they still retail Icom, GME-Electrophone, Philipps and Uniden rigs and scanners, plus of course all the necessary equipment such as antennas, SWR meters, coaxial cable and more.

They have also expanded their business to include radio equipment and accessories for 4WD owners. Add to this equipment for bushwalkers, hunters, paragliding, VHF marine, air-band, amateur, GPS satellite navigation systems and cellular 'phones, both digital and analogue and you quickly see that they can provide a solution for virtually any problem involving these various areas. They always have a wide range of scanners in stock which enables people to listen to emergency services such as ambulances, fire brigade, police, etc. and there are comprehensive frequency registers to tell you where to find these various services. On the antenna side of things they stock ZCG pre-tuned antennas for 27MHz and UHF base and mobile rigs including the heavy duty, long range car 'phone units especially designed for 4WDs and trucks. They also carry Mobile One antennas, Benelec UHF base antennas, etc.



The staff of Time Plus with proprietor John Cullen on the right.

It should be obvious from the above that Time Plus is one of the CB industry stayers and you can be assured of top service, tuning and repairs, including most of the older sets which can often prove difficult to have repaired.

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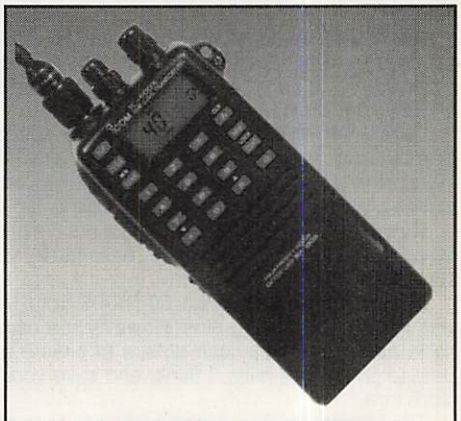

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Frequently Asked Questions about...

CB, SCANNING, SHORTWAVE LISTENING

NO SW RECEPTION...

My location is in a valley and right in front of some hills but there are no high-rise buildings in front of mine for another several blocks.

Being new to DXing, I thought that all I need to do is to punch in the radio station and receive its signal!

But I've heard absolutely nothing! (actually I did receive very weak signal from China, Cuba, Japan). So I'm asking myself if DXing involves patience, location, hardware, etc...am I stuck with what I can hear from where where I am living?

What about SYNC, SSB, LSB, USB etc.. what are these and how do I use them?

For a start, DXing/SWLing in a modern apartment building of reinforced concrete is hardly possible, only VERY strong signals will get through.

Take your radio outside to a park, wood, open space and try if it works better there. Most likely it will. If it does, the problem is your apartment, not the radio. You may try throwing anything between 6 - 30 feet of antenna wire on the floor, balcony or out of the window, it usually improves reception compared with the telescopic antenna.

SYNC, SSB, LSB, USB should be explained in the manual and is of no use to you if you cannot hear anything.

To put it simply, these features allow you to cut the receiving frequency down the middle and you can chose whatever side has less interference from neighbouring stations, i.e. Upper Side Band (USB) Lower Side Band (LSB)... SSB is single sideband and is either USB or LSB.

SYNC is a feature that in some instances overcomes fading.

Your main problem seems to be the building though. The basic problem cannot be overcome, but there are ways to improve reception. Some extra feet of antenna wire usually do the trick.

However, the radio will most likely pick up radio frequency interference from computers, air conditioners, fluorescent lights, power lines, etc. and reception will always be less than perfect.

FREQUENCIES
- WHERE DO I FIND THEM?

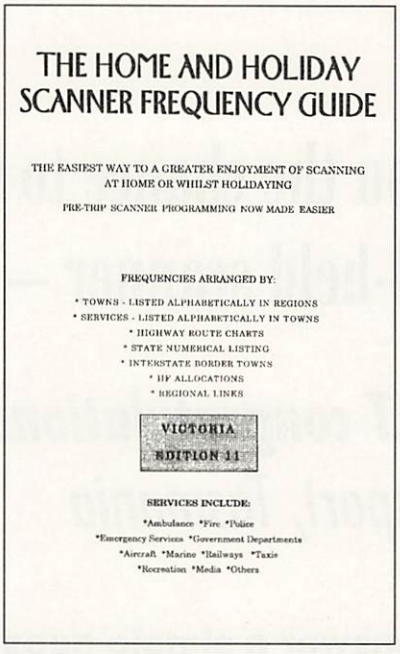
I recently purchased a scanner but I don't know where to find a list of frequencies. I know CBA runs some in each issue - but is there a complete list that I can buy?

Most specialist communication shops stock a range of Frequency Registers from different compilers. They are usually based on a specific state - ie.. Vic, NSW, etc. and their formats vary from one Register to the next. One that we saw recently is The Home & Holiday Scanner Frequency Guide" for Victoria.

This coil bound book is the best quality register we have seen to date and features include towns listed alphabetically in regions, highway route charts, HF allocations, regional links, numerical listings, over-the-border interstate towns and a frequency range 1.7MHz to 1.4GHz.

The services listed include ambulance, fire, police, emergency services, government departments, aircraft, marine, railways, taxis, sport & recreation, news services - and more.

As is pretty obvious from the above, this is a comprehensive register which provides a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SERVICES INCLUDE:
*Ambulance *Fire *Police
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*Aircraft *Marine *Railways *Taxis
*Recreation *Media *Others

huge amount of frequency information.

The "highway route charts" allow you to program frequencies for the next days travel instead of having to spend time with a map trying to figure what frequencies are worth listening too as you drive. Along with this Victorian version, there are similar registers for SA/NT and NSW/ACT with Qld and WA being finalised.

The current retail price is around $39 and it should be available at your local specialist communication shop. If not, call (03) 879 7598 or fax (03) 879 7608 for details of your closest stockist.

WHAT IS INTERNET?

It seems that "internet" is the current buzzword. Everywhere I go I hear people about it - on air, on TV, in the daily papers, etc.

Would you please tell me what the hell it is, where it is, and what it does?

A formal explanation of internet is as follows...

The Internet is a collection of thousands of networks linked by a common set of technical protocols which make it possible for users of any one of the networks to communicate with or use the services located on any of the other networks.

These protocols are referred to as TCP/IP or the TCP/IP protocol suite.

The Internet started with the ARPANET, but now includes such networks as the National Science Foundation Network (NSFNET), the Australian Academic and Research Network (AARNet), the NASA Science Internet (NSI), the Swiss Academic and Research Network (SWITCH), and about 10,000 other large and small, commercial and research, networks.

There are other major wide area networks that are not based on the TCP/IP protocols and are thus often not considered part of the Internet.

However, it is possible to communicate between them and the Internet via electronic mail because of mail gateways that act as "translators" between the different network protocols involved.

Note: You will often see "internet" with a small "i".

This could refer to any network built based on TCP/IP, or might refer to networks using other protocol families that are composites built of smaller networks.

An informal and simplified explanation is that internet is a method of communication between computers - both within Australia and virtually anywhere in the world.

These computers are linked to each other and accessed via the telephone using a modem - in a somewhat similar style to using an electronic bulletin board.

Depending on the "service provider", you will pay some sort of charge to use the system and, as with bulletin boards, there are good and not so good internet providers.

The use of internet allows you to access an enormous of information ranging from the latest VOA radio schedule to erotic art in Mongolia - in short, there's something there for everyone.

You can subscribe to (join) a host of newsgroups which concentrate on specific things such as home-brewing everything from beer to transceivers, motorsport, music - in fact pretty much anything you can think of has a newsgroup - all you need to do is find it.

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FAQ, PO Box 622, Mount Eliza 3930.

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8. Entries must be received by Inside Football via the coupon provided. The winner shall be the first correct entry drawn out of the barrel on 15.12.94 at ACP Syme Magazines, 603-611 Little Lonsdale Street, Melbourne 3000. The winner will notified by mail and published in the Mar-Apr 1995 edition of CB Action.
9. Residents of South Australia may obtain one free entry by sending their name, address and a hand-drawn facsimile of the Inside Football magazine cover.
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GCBUN1

Man-made and atmospheric interference... incurable?

By Jack Haden

There can be nothing more frustrating than trying to either work or hear a weak DX signal, only to have the noise level on the band increase rapidly or have hash or other crud just appear from nowhere.

In the days when amateur radio enthusiasts had the 11 metre band allocation it was common knowledge amongst them that 27MHz was a noisy and unpredictable band at any given time. Back then, 11 metres was shared by quite a few other services such as paging systems and other low-power devices.

Some of these services are still on the band, but the majority have been moved to relatively 'interference-free' pastures so to speak.

Noise, both man-made and natural, is hard to escape from on any of the HF bands and thus in the world of the DXer, is considered one of the many hurdles one must jump in the pursuit of that rare DX!

In this feature I am going to look at both man-made and atmospheric noise in layman's terms in an effort not to confuse more than enlighten readers. Technically, this subject could run to many pages if we wished to delve in to this subject in depth. (Don't worry, we won't!)

Types of noise

The term **external noise** means exactly what is says: external. In other words the noise comes from a source completely unrelated to your radio station, and is picked up by your antenna and fed to the radio. So when you unplug the antenna from the radio the noise should be gone.

Should it remain, then you have *real* problems as this becomes receiver noise.

Receiver noise

Receiver noise is produced by the movement of electrons in any substance (such as resistors, transistors and FETs) that has a temperature above absolute zero (-273°C or Ø°K) and that, my friend, is a *really* technical subject! Those of you who own a general coverage HF communications receiver or a scanner will soon notice that external noise is confined to the HF bands and the higher in frequency you go the less a problem it becomes. You will find most external noise levels are very high at times on the 160, 80, 40 and 20 metre amateur bands. Some of the atmospheric noise is 'seasonal' (ie. it's far worse in the summer months than in the winter months, or vice versa).

Some of this noise can become disturbingly high in intensity if you live close to the equator, the reason being that the Sun's rays have a thinner layer of atmosphere to travel through to reach ground at the equator.

People living greater distances north or south of the equator suffer less from this type of noise.

However, a similar situation also exists in both of the polar regions, particularly during the polar summers.

On the higher frequencies, 30MHz and up through to the microwave spectrum, the problem of external noise is replaced by 'receiver noise', which we touched on earlier and becomes a primary consideration.

At these higher frequencies the receiver's own noise always exceeds that of external sources, especially at two metres (150 MHz) VHF and above. So, we will leave the topic of receiver noise here as we are primarily dealing with the 11 metre band situation.

Atmospheric noise

There is often so much noise and other strange sounds going on across the 11 metre band that it is often hard to distinguish natural atmospheric noise from that of man-made noise.

Buzzing, humming, hissing, crackling and burping sounds are very common across the band, with some even appearing to be moving up or down the band (such as the well-known 'washing machine' noise or the 'burp-burp-burp' machine). I have often been asked by many people on air as to whether these noises are atmospheric or man-made.

As I mentioned, with so much crud on the band at times it is very difficult to determine the source of the noise!

The weather is a big contributor to noise on the HF bands, which 11 metres is a part of, and can come to us in a variety of forms throughout the year. In summer, electrical storms provide a lot of crackle and hiss across the band as the charged particles in the atmosphere clash (ie.: thunder and lightning).

Noise from an electrical storm can be heard on your radio well before you visually sight the storm on the horizon, such are the high voltages being generated in the atmosphere.

However, it doesn't have to be an electrical storm to cause noise in your radio. A heavy rain storm can make the radio reception pop, crackle and hiss. This is due to static build-up in the immediate atmosphere being electrically charged by the rain — most common when the relative humidity is extremely high.

Also in summer (when there is irregular rain fall to keep the ground moist, or in periods of drought) the common 'whirly-wind' or twister can cause static crashes and hissing on the radio bands. This phenomenon is due to the high levels of **static electricity** created by dust particles rubbing together as they're whipped up by the whirly wind and blown about.

This creates bursts of electrical energy, which is released into the atmosphere with quite a bang.

....☞

Man-made and atmospheric interference ... incurable?

(continued from previous page...)

Static electricity can also build up on your base station radio antenna if it is not properly grounded (earthed). Inadequate earthing is the usual cause of this static build-up and can be particularly bad during storm activity. Antennas mounted on non-conductive materials such as wooden or plastic poles suffer from static electricity build up and thus pass high noise levels to the receiver.

The antenna can be earthed to ground even though mounted on a wooden or plastic pole by way of a copper strap or a simple lightning arrester inserted in the feedline near the base of the antenna.

This will discharge direct to ground any static build up which may occur in the antenna.

Antennas mounted on water pipe or strapped to chimneys via metal clamps are considered 'earthed' as the building they are on is considered as grounded.

Solar noise which, as its name suggests, is generated by the sun, also causes a wide range of interference to the HF bands and to 11 metres in particular.

Anyone who has been on any of the HF bands when a huge solar flare has taken place can attest to the high level of noise that 'whooshes' across the bands during this phenomenon.

Your S-meter can rise up to and in excess of strength seven when these huge flares occurs and thus create a 'shortwave fade-out' on all HF bands sometimes lasting for minutes or hours on end.

A lot of the noise we hear across 27MHz can be attributed to solar noise, especially this fluctuating hissing noise that everyone has heard at one time or another. You may also notice that this noise tends to move across the band and is sometimes 10 to 40kHz wide.

Ultra violet radiation from the sun charging particles in the ionosphere (belts of charged gases which surround the earth at extremely high altitudes) also provides natural interference to the band and thus varies in intensity and, of course, provides a wide variety of weird sounds across the band!

Once again, it is sometimes very hard to classify the noises heard across the band as to whether they are, in fact, natural or **man-made**...

Man-made noise

The typical modern home of the 1990s is full of electrical wizardry, all of which is designed to make our lives easier — until we have a blackout! Unfortunately, some of these appliances themselves also cause interference to the radio communications fanatics' leisure listening.

At some time or another we have all fallen victim to some sort of household appliance interference which sometimes wipes out radio reception entirely whilst the offending appliance is being employed.

Among the most common sources of interference are: hair dryers, heater blowers, faulty electric stoves, faulty electric hot water units, electric typewriters, computer terminals, sewing machines, vacuum cleaners, TV/VCR systems, defective toasters/sandwich makers, fluorescent lights (including those so-called energy-saving lamps), garage door remote-controllers, refrigerators and, of course, other radios!

With small appliances, such as hair dryers and the like, not a great deal can be done about their interference, as most are cheap and nasty products out of third world sweat shops with little or no circuit shielding.

I mentioned 'faulty' electric stoves and hot water units for a reason.

The majority of brands sold in Australia are pretty good and cause no interference when in operation — until they become defective, that is.

I once searched for two days looking for the source of S-5 hash which came and went on 11 metres, only to find that it was a hot water unit creating the problem because an electrical fault had occurred in the thermostat.

A similar situation occurred at a friend's house each time his wife was cooking a meal.

Yes, it was a defective element in the electric stove arcing and causing hash on the radio. Some brands of computers and electric typewriters (ones with memory retention) can cause at least a couple of S-points noise level on the radio if switched on in the immediate vicinity.

I cannot have my big Adler electronic typewriter switched on in the shack at the same time as the radio as it wipes out the receiver by a full three S-points. However, it's fine elsewhere in the house...

Televisions and VCRs can generate quite a lot of 'crud' across the HF radio spectrum, with a wide 'buzzing' sound heard at regular spacings on the band whilst the said units are switched on.

This crud can even get in to your radio from your immediate neighbors' TVs or VCRs, or even computer systems, and there is not a great deal you can do about it either!

CBers living in flats or apartments can have no end of interference problems, especially from TV/VCR units, computers and hair dryers.

Another potential form of household interference can come from the household clothes dryer — again, the majority sold here in Australia conform pretty well and give no trouble, however should they become defective, beware! Fluorescent lighting can give trouble too, which is why you see many radio enthusiasts run standard globes in their shacks instead of fluorescent tubes. Once, a few years back, I was copping persistent S-3 noise every night, making DXing nearly impossible as far as weak stations were concerned. I searched my own place from top to bottom switching this and that on and off in my search for the noise's source.

A week later I found the problem; my neighbor's fluorescent security light on his garage door had shorted out and was flicking on and off.

Sure enough, after the globe was replaced my problem disappeared.

The do-it-yourself workshop located in many a neighbor's rear shed or garage can also be a minefield of interference.

Grinders, drills, sanders, polishers and welders can make your receiver go wild with noise, not to mention you on missing out on the rare DX! There is not a great deal you can legally do about this type of interference — grin and bear it, or have a kind word with the culprit, and set up some times so that you don't clash may be the only

answer. There are not a lot of avenues open within regard to solving these problems, although some home-brew remedies (ferrite rod or toroid beads wrapped around power cords and other leads) may work in some instances.

A lot of it has to do with the quality of the electrical appliances that cause the interference... and, dare I suggest, the quality of some of the radio sets around these days.

Cheap and nasty, poorly earthed, unshielded or just rubbish components all contribute to interference problems and, sadly, there is not a great deal we can do to banish these problems away.

Cordless telephones have also joined the list of potential interference contributors, some brands being worse than others whilst some don't give any problems at all.

In Sydney one of my neighbors was a regular cordless telephone user. How did I know this?

Well, I could pick up his entire conversations, *both* sides on 11 metres, by way of a harmonic generated from the cordless handset.

He was a good five by nine plus 10dB over every time he used it!

(**Editor's note**: don't ever fall into the trap of thinking that your conversations on cordless telephones are private.

The six metre correspondent to our sister magazine Amateur Radio Action often reports picking up strong cordless phone signals — from Malaysia, the Philippines and Hong Kong... and he lives in Hamilton, Victoria!) We live in a very complex society these days, both communications-wise and electrically, and as years go on we tend to take these gadgets for granted. However, as their numbers increase, so do potential interference problems!

Local sources of noise

In suburbia there are many sources that contribute to some electrical forms of interference to our radio equipment and thus a variety of sounds can be heard across 27MHz.

Neon advertising lights are usually bad news, especially the flashing variety. I once knew a DXer in Melbourne who lived on top of some shops where one of these lights was fitted.

At night, when the lights came on, he would have to close down his radio, as the noise was so severe (reaching levels of S-9 hash and buzzing sounds generated by this system of lighting). It is quite amazing too that the distance this hash can radiate, sometimes up to two blocks away in severe cases.

Street lights, now commonly using RF-generating fluorescent gas tubes, can also generate crud and other hissing sounds, as can defective transformers on poles, and these generate spurious signals all *over* the place.

And let's not forget cracked or broken insulators on power poles too.

These are prime sources of interference, especially after a shower of rain or in damp, humid or foggy conditions where moisture abounds.

If you live in a highly industrialised suburb you will no doubt notice the rise in the noise level at the start of each working day as machinery is switched on.

The noise level usually tapers off around the 4:30pm knock-off time and is often absent altogether on weekends or public holidays.

Again, there is not a lot you can do about this type of interference, except move location or just stay put and endure it without complaint.

Items such as cracked or broken insulators or defective transformers on power poles can be cured by simply telephoning the electricity supply authority maintenance department.

They are usually obliging and will generally attend to the matter as soon as they can — but industrial noise... well, it's a case of simply putting up with it!

As mentioned, a lot of noise suddenly appears on the radio during or after heavy rain, especially in the summer when it is dry for long periods.

This noise comes from the power lines themselves, and quite often you can hear it yourself simply by standing near a pole when you should be able to hear the humming and buzzing quite clearly.

There can be little done about this, as the problem is attributed to moisture, so once things dry out it will be back to normal again — until the next shower. The same thing often happens at night when dampness or fog is present in the atmosphere.

Hospital paging systems resident on 27MHz can generate quite a lot of interference across the band and splatter for quite some distance away too.

Some of these pagers can, in fact, splatter up to 40 kHz wide or so depending on your proximity to the device. Another common generator of interference is the burglar alarm which has been tripped in a factory or shop.

These, if not the resetting variety, can go on and on spewing out hash across the band.

Usually their radiation pattern is restricted to a block or two radius and seldom go beyond.

Their small cousins, the car alarms, can also spew out similar hash and crud which can be picked up by your radio too, with some particular brand-name alarms worse than others.

Conclusion

Not a great deal of good news for you — there isn't much we can do about a lot of the sources of interference we have mentioned. Of course, a lot depends on the type of radio and antenna system you operate.

Some base station antennas are simply *too* sensitive and pull in this unwanted noise, some radios have poor rejection ability and thus can become overloaded as the noise level increases.

Then again, a lot of the big base station transceivers (especially amateur radio ones) are loaded with noise and notch filters to relieve some of the problems we face when encountering noise on the radio.

As a last resort you can try moving your antenna, changing it from omnidirectional to directional, increasing or decreasing its height, or even change the style of antenna — say from a half-wave to a five-eighths.

Try different transceivers to see if there is any difference. Try moving your equipment in the house, from upstairs to downstairs or vice versa, from in the house to the garage or in reverse as the case may be.

No radio enthusiast likes to be on the receiving end of interference but, sadly, whether it be man-made or atmospheric, there is little in most cases that can be done about solving the problem entirely

AUSTRALIAN ASSOCIATION OF CITIZEN and BAND RADIO OPERATORS Inc.

CB class license — callsign concern

Since October 3, 1994, the 'Class Licence' system has been in force to cover people who operate CB-type apparatus without needing an individual license for the equipment... providing, of course, that it meets the standards covered by the class license.

The new arrangements require those who operate under the class licence to conform with the regulations of the licence, whilst others who operate under the previous system (having paid their licence fee) are required to conform with the regulations that were in force at the time of renewing or taking out their licence.

The changes are only minor, so there is no need for CBers to rush out to get a copy of the changes but, needless to say, as new chums enter the CB fraternity without having to get a license and the callsign that goes with it, they will differ from the majority who currently have been in possession of an earlier callsign. Incidentally, for those who are in this majority, with an issued callsign, they may continue to use it, and are in fact encouraged to so do.

Does this present a problem? From listening to some of the comments on radio since the introduction of the class license system, the only concern spotted so far is that some operators feel that the 'real' callsign, and its use, was an important part of procedure.

In the main, these comments have come from users of the UHF section of the CBRS. In fact, in Adelaide, one of the complainants was one whose use of his own callsign was indeed very spasmodic! But 'no worries', the common catch cry heard on the band, because it has always been a grey area in respect to how often one should identify with his or her callsign.

So, in general, the introduction of the class license system for CBers has been met with favor by the majority, and in fact some letters of a congratulatory nature have been received by ACBRO for any part it played in bringing about this reform.

But in providing honesty in this regard, one letter has been received in the negative. It is a good and well-presented letter, and is so well thought-out that we feel we should not ignore it. It is reproduced here in full, with the writer's name omitted, as it was not written as a letter to the editor (for publication).

"Dear Sir/Madam,

"I am writing in regard to the comments made by ACBRO in the November/December 1994 issue of CB Action, in relation to the change in CBRS licensing.

"I have been a licensed CBRS operator on HF since its legalisation in 1976, and on UHF since around 1980 or so. I have constantly renewed my licences, usually three to four CBRS licences each year, since I first started, although at times I must admit that I wondered why.

"I have seen the days of $25 per radio, then $25 for up to five, then $11 for each, right up to the $18 per radio which existed until the beginning of October. I agree with your enthusiasm regarding the Class Licences for 27MHz, but I feel that your organisation is ignoring the thoughts and needs of the UHF community.

"For many years, CBRS operators complained about paying for a licence, but many still paid. For the majority of 27MHz users, the need for a licence and callsign appears to have been ignored for many years now. The informal and sometimes chaotic attitudes of many 27MHz users put the use of callsigns on that band obsolete. However, UHF is a totally different story, at least in my part of the country.

"Licence callsigns on UHF are a logical way of identifying each other, as no licence callsign is ever duplicated, as with self-chosen callsigns. Now, in your and the SMA's infinite wisdom, these have been abolished, meaning that UHF will move even closer to resembling the good old AM Call Channel. Well done guys — as if the UHF band in the big cities wasn't bad enough, you have now effectively removed the only means that prevented UHF from sinking to the depths of 27MHz!

"I would very much love to know exactly who was consulted about these changes.]

As I said, I am a licensed CBRS operator of some 18 years standing, yet the first I knew about the Class Licence was when I read it in CB Action. CB Radio was difficult enough to police with a licence system, but now you have thrown all of that away and opened up the UHF band to total mayhem. If you truly wanted to serve the CB public and help all, why not change the system to an 'Operator Licence', as it was supposed to be, and require only ***one*** *licence to operate* ***any*** *CBRS station?*

"At least then the callsigns would remain and we would still have a means of identifying each station, but I guess that this choice must have been too logical. Do any of you realise just how many 'base' and 'Mobile 1' callsigns are being used on UHF? Until now, many business users have used these callsigns in conjunction with their licence callsign, or at least the last three numbers, but what now?

"I'm sorry, ACBRO, but the wonderful new system does not have my vote, nor that of many other UHF CBRS operators in this region. We all like the idea of not having to pay a fee, but will the disadvantages outweigh the advantages? Probably! Watch out, amateur radio, here comes a major influx of ex-good buddies!"

ACBRO responds...

Our correspondent has presented a point, or in fact *many* points of view in his letter, and some of them may be shared by others. Much space could be occupied here in commenting on his views, but they, like his comments, would be those of yet another individual.

But several answers in response may be beneficial to readers who may have wished to ask similar questions.

Who was consulted? In fact, the CB fraternity has just experienced the best form of consultation since the CBRS was legalised. The SMA conducted many seminars in Australia's capital cities and major regional centres following the publication of its discussion paper of December 1993 (titled An Inquiry into the Apparatus Licence System).

Quite a bit of publicity through the major press and specialist radio magazines provided ample opportunity for members of the public to express an opinion.

The SMA called for submissions from the public to be presented by March 15, 1994, relating to the proposed changes. CB Action provided progress reports, and ACBRO members through their bi-monthly publication were kept informed of possible changes that were being sought, as were the many clubs listed in these pages.

The operator's license which our correspondent favors was an alternative which ACBRO included in some discussions on the subject of license fee reform. But the whole idea was to consider the abolition of the fee so, needless to say, this approach could not have worked, as the cost of administering a licensing service is high.

Our correspondent's bottom line poses a question which he has probably adequately answered himself... "...not having to pay a

fee, but will the disadvantages outweigh the advantages?..." to which he answered himself that it "...probably..." would.

ACBRO feels that most CBers would want to remind our writer that they will collectively save nearly six and a half million dollars annually — money which would otherwise have had to be paid to the government as a tax for the privilege of CBing. The loss of a callsign, which was recently made into a bigger mouthful (*four* letters and *four* numbers) appears to be a small price to pay for such a large dollar saving.

You *can* have a callsign under the class licence. Recent ACBRO discussions with SMA, which focussed on the loss of callsigns, indicated that the SMA is little concerned. Sure, a callsign is a great tool for it to identify the troublemakers... but how many of them would carefully identify themselves with their callsign before they harassed you on air? How many would interrupt their music concerts to include a station ID?

On this point even our writer would have to join the consensus of agreement. The SMA has indicated that clubs and organisations like ACBRO can play an important part in filling this void. They are encouraged to perhaps continue as they have, by issuing their own callsigns for members and, importantly, assist in the **self-regulation** which is now a major part of the CBRS.

A $7 per year membership to ACBRO includes the issue of a membership number, which could now serve quite adequately as a callsign. In fact, ACBRO is now considering a move to amend its current policy of re-issuing membership numbers as members drop out, which would enable these operators to retain and use their issued number as a callsign, even if they fail to join another group which may allocate callsigns of its own.

So to new operators getting into the CB scene, this may be a lead which will help you — if you hear others with some sort of official-sounding callsign, you could follow suit. But, of course, if you wish to create your own callsign, do so with wisdom. A ridiculous callsign may restrict those who may wish to acknowledge your CQ call; after all, who wants to enter into an intelligent conversation with something like *the Blood-suckin' Vampire*?

I would hope that silly, way-out calls like those might only ever be heard on the HF part of the CBRS band — and we'd rather they weren't heard at all! ACBRO will certainly be in touch with its affiliated clubs to encourage a sensible approach to any problem brought about by the loss of official (expensive) callsigns.

And to our correspondent, and others of a similar opinion, take a hint: use a small part of that bonanza you are now saving from annual license fees, and invest it in membership with a body such as ACBRO. You'll benefit in more ways than one. Here's a couple: you'll receive a callsign like this — the **ACBRO 981**, (it's just as easy to say that as VHSA-4532!) and, of course, you'll be kept informed of matters affecting our service.

But, of course, make sure you keep reading CB ACTION, because it invariably covers such matters in a more in-depth fashion!

Until next time...

ACBRO ASSOCIATED CLUBS

Below is a list of clubs and organisations affiliated with ACBRO Inc. If you have one of them in your area, please give them your support of membership. Full details can be obtained by contacting the group of your choice from below.

For membership or affiliation enquiries please contact:
ACBRO Inc., P.O. Box 170, Walkerville 5081, South Australia.

Cleveland Bay Radio Club	P.O. Box 1641, Aitkenvale,QLD 4814
SA Rotten Radio UHF Assoc.	P.O. Box 4, Dry Creek,SA 5094
LT Club Inc.	P.O. Box 626, Launceston,TAS 7250
Albany Communications Group	65 Hassell St. Elleker, WA 6330
Radio City Australia	26 Wootten St. Greenacres SA 5086
Pioneer Radio Association (SA)	P.O. Box 1017 Salisbury, SA 5108
Plantaganet Rep't Institute of WA	PMB 306, Cranbrook, WA 6321
Burnie Citizens Radio Club	P.O. Box 655, Burnie, TAS, 7320
Transworld CB Radio Club	90 Crozier Avenue, Daw Park SA 5041
Canning River Radio Club	53 Parkside Ave, Mt. Pleasant WA 6153
Overland Radio Club	P.O. Box 1010, Murray Bridge, SA 5253
Eureka CB Radio Club	P.O. Box 27, Reynella, SA 5161
Transworld Sidebanders (The X/Ray Club)	13 First Street, Port Pirie, SA 5540
Echo Romeo CB Assoc.	P.O. Box 302, Morphett Vale SA 5162
Rotten Radio Group Intnl	P.O. Box 4, Dry Creek SA 5094
Broken Hill UHF Repeater Club Inc.	P.O. Box 1023, Broken Hill NSW 2880
Gippsland Repeater Assoc. Inc.	P.O. Box 555, Maffra, VIC 3860
Murray Bridge Agric & Hort Society	P.O. Box 315, Murray Br., SA 5253
Samba Club	P.O. Box 16, Salisbury, SA 5108
Tweed Radio DX Group Intnl	P.O. Box 773, Murwillumbah, NSW 2484
The Pathfinder Radio Soc. Club	P.O. Box 24, Woodridge, QLD. 4114
Dirty Dozen Radio Group	P.O. Box 426, Morphett Vale, SA 5162
Hotel Zulu Radio Group Inc.	P.O. Box 66, Elizabeth, SA 5112
White Fox Radio club	P.O. Box 288, Salisbury, SA 5108
Mega Mouth International	P.O. Box 55, Mowbray, Launceston, TAS 7250
The Triple "R's" Group	451 Regency Road, Sefton Park, SA 5083
Tru Blue Radio Group	P.O. Box 379, Blackwater, QLD. 4717
Sugar Valley Radio Club	9 Martin Place, Edgeworth, NSW 2285
Blue O Radio Group	P.O. Box 53, Monaro Cresc, ACT 2603
Sydney Radio Group	P.O. Box 185, Gordon, NSW 2072
Ratbag CB Radio club	P.O. Box 227, Welland, SA 5007
Sun Centre CB Radio Club	P.O. Box 912, Swan Hill, VIC 3585
Port Adelaide Radio Club	P.O. Box 352, Pt. Adelaide, SA 5015
Cherokee Indian Aust. Group	P.O. Box 1679, Mildura, VIC 3500
Sth. West District CB Radio Club	P.O. Box 620, Warrnambool, VIC 3280
A.M.O.S. CB Radio Club Intnl	P.O. Box 351, Broken Hill, NSW 2880
Pioneer Radio Association Aust.	P.O. Box 1415, Mount Isa, QLD 4827
Naracoorte UHF Association	P.O. Box 465, Naracoorte, SA 5271
Gosford Radio Club	50 Pacific Highway, West Gosford, NSW 2250
Ultra-Lite Radio Club Inc.	P.O. Box 17, Strathpine, QLD 4500
Felix Radio Club	P.O. Box 78, Goodna, QLD 4300
Inlander CB Radio Club	P.O. Box 5712, Rockhampton, QLD 4702
Aust. Red-Heeler Soc. Radio Club	P.O. Box 8018, Wynnum North, QLD 4178
Central West CB Radio Club Inc.	P.O. Box 628, Orange, NSW 2800
Vic Red Heeler Radio & DX Group	P.O. Box 1802, Ballarat, VIC 3354.
Kilo Romeo Circle of Friends	P.O. Box 16, Cleveland, QLD 4163
Radio Hobart Group	P.O. Box 266, Glenorchy, TAS 7010.
Welsh Dragon Radio Club	P.O. Box 581, Belmont, VIC 3216
Oscar Romeo CB Club	P.O. Box 203, North Geelong, VIC 3215
Coal Miners Wonthaggi CB Club	P.O. Box 420, Wonthaggi, VIC 3995
East Coast Radio Club	P.O. Box 412, Bexley, NSW 2207
MBV 08 Repeater Assoc.	c/o Post Office, Charleston, SA 5244
Q'land Radio DX International Club	P.O. Box 586, Warwick, QLD 4370
Q'land Blue Heeler Soc. Radio Club	P.O. Box 1122, Castle Hill, NSW 2154
The 43 Australian Radio DX Club	P.O. Box 96, South Oakleigh, VIC 3167
Sugar Valley Radio Club	P.O. Box 1070, Edgeworth, NSW 2285
Ozzy Eagle DX Group	P.O. Box W110, Armidale, NSW 2350
Home Brew Makers CB Radio Club	1 Lexen Court, Hattonvale, QLD 4341
International Black Duck DX Group	1 Lexen Court, Hattonvale, QLD 4341
Ozzie Radio DX Group	P.O. Box 683, Bairnsdale, VIC 3975
Aust. Nat. Four Wheel Drive Council	P.O. Box 79, Canberra, ACT 2601
The UHF Assoc. of Western Australia	P.O. Box 316, Cloverdale, WA 6105

CB UHF REPEATER LIST

NEW SOUTH WALES

Callsign	Town/Locality
	CHANNEL 1
BEL01	Belbora
BHI01	Broken Hill
BIN01	Bingara
BOB01	Harden
BRE01	Brewarrina
BRH01	near Broken Hill
BUN1	near Merriwa
CHT01	Charlestown
COR01	Corowa
DNQ01	Deniliquin
GRE01	Grenfell
GUY01	Guyra
JIN01	near Jindabyne
KGL01	Kyogle
MBI01	Moonbi
MRT01	Wilcannia
MTE01	Mt Eagle
NEE01	Dubbo
NIM01	Nimmitabel
NYN01	Nyngan
RYL01	Rylestone
SYD01	Sydney
ULA01	Ulladulla
WAG01	Wagga
WGT01	Walgett
	CHANNEL 2
BER02	near Gloucester
BRH02	Broken Hill
CAN02	Cangai - West of Grafton
EDN02	Bega / Eden
GDH02	Gunnedah
INV02	Inverell
KHN02	Khancoban
KOS02	near Thredbo
KUR02	Sydney - Blacktown
LGW02	Mt Lambie
LIS02	near Byron Bay
MAC02	Port Macquarie
NBR02	Wee Waa / Narrabri
NOW02	Nowra
PAR02	Parkes
WAL02	Walcha
WAN02	Wanaaring
WBD02	Walbundrie
VRB02	Urbenville
	CHANNEL 3
CAN03	near Orange
CAS03	Casino
COM03	Mt Kophi
DUN03	Dungog
GIL03	Braidwood
GTH03	Griffith
MDI03	Murrurundi
MNA03	Manilla
MOR03	Moree
MTI03	Tubramurra Shire
PLO03	East of Armidale
RWT03	Hay
SYD03	Sydney
TEN03	Tenterfield
	CHANNEL 4
ALB04	Albury
ARM04	Armidale
CBN04	Coonabarabran
DRK04	Girard
GLB04	Goulburn
HAY04	Hay
MON04	Kandos - near Mudgee
MUS04	Muswellbrook
OGU04	Ogunbi - near Tamworth
RIV04	Penrith Area
SOU04	near Cooma
THA04	near Broken Hill
TUL04	Tullibigeal
TWH04	Banora Point
WAN04	Mt Wandera
WAR04	Warialda
YNG04	Young
	CHANNEL 5
	EMERGENCY REPEATERS
BIN05	**Katoomba**
BKE05	**Mt Gunderbooka**
CAP05	**near Tenterfield**
CHN05	**Charlestown**
COR05	**Corowa**
FOR05	**Mount Tallabung**
FRA05	**Bellingen**
GLB05	**Goulburn**
JIN05	**Jindabyne**
MTS05	**Narromine**
MTU05	**S-West Slopes, East River**
OXY05	**Bourke**
SYD05	**Sydney**
TAM05	**Tamworth**
TBO05	**Mt Talbingo**
	CHANNEL 6
BAR06	near Narrabri
BON06	Bonshaw - Q/NSW border
COF06	Coffs Harbour
COL06	Oakey
GGG06	Glengary
LGW06	Lithgow
MAL06	Mallanganee
MTG06	Bowral
MUM06	Mumbulla Mountain
NAR06	Narromine
NEW06	Sugarloaf Range
ROB06	Mt Robert
TUM06	SnowyMountains
WAL06	Walcha
WEN06	Tolarno
	CHANNEL 7
BAL07	Buckombil Hill
BOM07	Bombala
BO007	Booral - near Bulahdelah
COW07	Cowra
GLH07	Glen Lyon
GLI07	Glen Innes
MIL07	Milton
NUN07	Nundle - near Tamworth
SYD07	Sydney
WAL07	East of Walcha
	CHANNEL 8
BAT08	Bathurst
COB08	Cobar
CON08	Condobolin
EUC08	near Eucumbene
GLE08	Glen Innes
GRE08	Gresford - near Dungog
GRF08	near Grafton
KEM08	Kempsey
MER08	near Merimbula
MUR08	Tomewin
NAR08	Narrandera
ROB08	Illawarra
TBC08	Tooleybuc
URA08	Uralla - near Armidale
WAL08	Walcha
WOY08	Kariong

The input channels are listed below:

IN	Frequency (MHZ)	
1	476.425	
2	476.450	
3	476.475	
4	476.500	
5	476.525	** for emergency use only
6	476.550	
7	476.575	
8	476.600	

The following channels are the output channels for a repeater:

OUT	Frequency (MHz)	
31	477.175	
32	477.200	
33	477.225	
34	477.250	
35	477.275	** for emergency use only
36	477.300	
37	477.325	
38	477.350	

NORTHERN TERRITORY

Callsign	Town/Locality
	CHANNEL 1
ALS01	85 KM SE of Alice Springs
BPK01	90 KM N of Alice Springs
DRW01	Darwin
KVB01	Double Hill
MLG01	Milingimbi
	CHANNEL 2
ALC02	115 KM NE of Alice Springs
DDB02	Garibaldi Station
SWN02	150 KM NNE of Alice Springs
	CHANNEL 3
ELK03	325 KM NE of Alice Springs
ERL03	185 KM SSW of Alice Springs
MMI03	Mistake Creek Station
	CHANNEL 4
DPW04	70 KM S of Alice Springs
MST04	110 KM S of Alice Springs
	CHANNEL 5
None assigned	
	CHANNEL 6
HEN06	120 KM SW of Alice Springs
	CHANNEL 7
AMB07	85 KM SE of Alice Springs
ASP07	Alice Springs
	CHANNEL 8
None assigned	

QUEENSLAND

Callsign	Town/Locality
	CHANNEL 1
ANN01	St Annes Range
BAR01	near Barcaldine
BAT01	Bathurst Heads
BNE01	Mt Cotton
DEL01	Collinsville
HAN01	Hannaford
HUG01	Hughenden
ING01	Inglewood
INN01	Innisfail
MDT01	Middlemount
MOR01	Mt Hope
OWN01	Mt Oweenee
RKY01	Mt Archer
ROM01	Mt Bassett
SPC01	Windorah
TSV01	Townsville
TTH01	Twin Hills
WBB01	Mt Perry
WCT01	Charters Towers
	CHANNEL 2
GLD02	Gladstone
GLN02	Glenden
ING02	Mt Cordelia
JCK02	Julia Creek
LAU02	Laura
MAB02	Broadsound Range
MIN02	Glenlyon Dam
POR02	Drummond Range
SPC02	Bowen
TAM02	Tambo
TAR02	Taroom
TRN02	Quilpie
TWB02	Mt Kynoch
WAG02	Aranyi South
WAV02	Wavell Heights
WBR02	Mt Kanigan
WON02	Cogango Range
	CHANNEL 3
ABC03	Gold Coast
CHI03	Chinchilla
CTS03	Charters Towers
INK03	Mt Inkerman
KIL03	Kilcoy
LAI03	Mt Beau Brummell
MBO03	Tinana
MTO03	Monto
MTW03	Mt William
PCC03	Edward River
SPR03	Springsure
VHO3	Mt Isa
	CHANNEL 4
BBG04	Sloping Hummock
DIP04	Double Island Point
EID04	Eidsvold
GDI04	Goondiwindi
HOP04	Rockhampton
IPS04	Ipswich
JER04	Jericho
MBH04	Moranbah
MOW04	Darling Downs
TSV04	Townsville
VHN4	Expedition Range
VHW4	Cannonvale
	CHANNEL 5
	EMERGENCY REPEATERS
ABC05	**Springbrook**
BNE05	**Mt Glorious**
CEM05	**Clermont**
FSB05	**Mt Goonaneman**
GEM05	**MtWolvi**
ING05	**Mt Cordelia**
MIL05	**Commodore Peak**
QBM05	**Darling Downs**

VHN05 Charters Towers
VHP05 Biloela

CHANNEL 6
BLK06 Blackdown Tablelands
BRA06 Sea View Range
CBT06 Mundubbera
CHT06 Mt Janet
CLE06 Police Mtn
CNE06 Bergen
DIM06 Mt North Iron
GLD06 Mt Larcom
MIL06 Palardo Hill
MKY06 Gympie / Mackay
PRR06 Clermont
RIC06 Yan Yean
TAM06 Tambo
THG06 Thargomindah
VHN06 Wilkes Knob

CHANNEL 7
BIL07 Banana Range
BNE07 Toohey Mtn
CTR07 Towers Hill
DMD07 Clermont
ESK07 Esk
GEM07 Gympie
IND07 Fraser Island
ING07 Mt Mercer
MUR07 Mt England
VHO7 Mt Hutton
WBB07 Mt Watalgan
WRA07 Warwick
YKA07 Mt Slowcombe

CHANNEL 8
AMI08 Amiens
AMP08 Monto
BAL08 Noondoo
BLL08 Blackall
CHN08 Mt Peanga
CHT08 Charters Towers
EMD08 Emerald
HBY08 Ghost Hill
MBR08 Mt Brisbane
NEB08 Nebo
ONV08 Ocean View
TLD08 Atherton
VHN08 Barkly Down

SOUTH AUSTRALIA

Callsign	Town/Locality
	CHANNEL 1
CDA01	Ceduna
MJN01	Oodnadatta
MTR01	Leigh Creek
PRC01	Carrieton (Nth of Orroroo)
PAR01	Adelaide (North)
TYN01	Oodnadatta
VLA3	Crystal Brook
	CHANNEL 2
BOR02	Bordertown
BRP02	Orroroo
CLV02	Cleve
MYP02	Myponga
VLA4	Kingoonya
	CHANNEL 3
ADL03	Adelaide (Central)
ALN03	Yunta
BLN03	Blinman, Flinders Ranges
CTR03	Moonta
KBY03	Port Elliot
UNO03	Port Augusta
	CHANNEL 4
BLF04	Port Pirie
BAR04	Nuriootpa
KOK04	Lake Gairdner West
NAR04	Lucindale
PKI04	Kangaroo Island
	Leigh Creek (North East of)
	CHANNEL 5
	EMERGENCY REPEATERS
ADL05	**Adelaide suburb**
BEE05	**Crystal Brook**
EUD05	**Eudunda**
MNT05	**west of Woomera**
MTG05	**Penola/Mt Gambier**
	CHANNEL 6
LST06	Elliston (Eyre Peninsula)
NON06	120 Km West of PtAugusta
REN06	Renmark
SNO06	Snowtown (nearPt Pirie)
TIN06	Coonalpyn
WKI06	Kangaroo Island
WLG06	Tarcoola
WLP06	Willpena
	CHANNEL 7
CLR07	Clare
MTG07	MtGambier
MUT07	south of Cockburn
UNO07	Kyancutta
VLA7	Streaky Bay
WIL07	Hawker
YKP07	Warooka
	CHANNEL 8
BRYY08	Burra
MBV08	Murray Bridge
MTA08	Quorn
PTL08	Tumby Bay/Port Lincoln
SW)	Oodnadatta (200 KM
	Yalata (187 Km N/W of Ceduna)

TASMANIA

Callsign	Town/Locality
	CHANNEL 1
DEV01	Devonport
FIS01	Flinders Island
SET01	Grasstree Hill
	CHANNEL 2
CHN02	Herring Back
LCN02	Launceston
TWC02	Mt Read
	CHANNEL 3
NEC03	Ben Lomond
	CHANNEL 4
MID04	Millers Bluff
	CHANNEL 5
	EMERGENCY REPEATERS
HBT05	**Hobart**
LTE05	**Fingerpost Hill**
	CHANNEL 6
REC06	Mt Paul
VJA6	Mt Lloyd
WCT06	St Valentines Peak
	CHANNEL 7
CHT07	Barren Tier
TNE07	Mt Victoria
	CHANNEL 8
BRN08	Burnie
TBL08	Table Mountain
TNE08	St Marys

VICTORIA

Callsign	Town/Locality
	CHANNEL 1
ALX01	Eildon
APS01	Apsley
MEL01	Melboume
OME01	near Omeo
ROU01	Penshurst
STA01	St Arnaud
WAL01	Walhalla
	CHANNEL 2
BAL02	Ballarat
KER02	Mt Kerang
MAN02	Mansfield
MOE02	Moe
PYA02	Pyalong
	CHANNEL 3
ABE03	South
DEL03	Bombala
HOR03	Horsham
FAL03	Falls Creek
JNR03	near Dartmoor
WBT03	Mt Wombat
WPH03	Weeaproinah
YLA03	Yelta
	CHANNEL 4
ANA04	Mt Anakie
ARA04	Ararat
BEN04	Bendigo
CRJ04	Traralgon
HAW04	Hawkesdale
MCA04	Marambingo Hill
	CHANNEL 5
	EMERGENCY REPEATERS
BAL05	**near Ballarat**
MAN05	**Mansfield**
MEL05	**Melboume**
RFY05	**Ruffy**
	CHANNEL 6
FOS06	Mt Fatigue
HLV06	Healesville
ECH06	Echuca
BRN06	Mt Concorde
MSS06	Mt Seldom Seen
SWH06	Swan Hill
WAN06	Wangandry
WIL06	Mt William
	CHANNEL 7
BOL07	Mt Bolton
BND07	near Bendigo
MEL07	Melbourne
MOR07	Mt Shadwell
MVL07	Mt Gordon
SHP07	Shepparton
TAL07	Mt Granya
	CHANNEL 8
ART08	Safety Beach
DUN08	Cavendish
HAR08	Mt Alexander
MCN08	Mt Cann
MYR08	Mt Porepunkah
TER08	Mt Terrible

WESTERN AUSTRALIA

Callsign	Town/Locality
	CHANNEL 1
COL01	Collie
DEN01	Denmark
GER01	Geraldton
KAM01	Kambalda
KAT01	Katanning
KLB01	Kellerberrin
LEN01	Leonora
MIA01	Mia Mia Station
MKT01	Poison Hills
PER01	Perth
WAR01	Warakuma
WIK01	Wickham
	CHANNEL 2
BIN02	Bindoon
BUN02	Near Bunbury
CAR02	Carnamah
KAL02	Mt Charlotte
LYN02	Lyndon Station
MRD02	Merredin
VLN5	Mt McLure
WLP02	Walpole
	CHANNEL 3
ALB03	Albany
CLA03	near Carlotta
NOR03	Nannup
PER03	Roleystone
VET03	near Bardoc
	CHANNEL 4
BYB04	Dinninup
ESP04	Esperance
GNG04	Lancelin
KUL04	Kulin
MTB04	Cranbrook
NEW04	Newman
	CHANNEL 5
	EMERGENCY REPEATERS
PER05	**Orange Grove**
MTR05	**Mt Barker**
VLN6	**Perth**
	CHANNEL 6
DAR06	Darkan
JUR06	Mt Lesueur
MGR06	near Margaret River
MNP06	Albany
MTS06	Mt Solus
VKM06	Wyalkatchem
	CHANNEL 7
BDG07	Bridgetown
C0007	Coolgardie
MGR07	Augusta
MTB07	Stirling Ranges
PIN07	Pinjarra East
VRK07	Mt Bakewell
	CHANNEL 8
MAN08	West Manjimup
MSA08	Mt Saddleback
PER08	Kalamunda
QUN08	Quinorlup
RVT08	Ravensthorpe

A.C.T.

Callsign	Town/Locality
	CHANNEL 1
CBA01	Canberra (Portable)
	CHANNEL 2
CBA02	Isaacs Ridge
	CHANNEL 7
GIN07	Mt Ginini
	CHANNEL 8
CBA08	Isaacs Rid

REPEATER UPDATE

To maintain the UHF repeater list in an up-to-date manner requires the co-operation of repeater owners and local users. Please ensure that when an error is found, or an update is required, that you contact:
Trevor Colwell, ACBRO Inc.,
PO Box 170,
Walkerville 5081, South Australia
who will ensure that this information is included in the next repeater list.

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